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13. ABSTRACT (Maximum 200 words)

In 1995, TRADOC initiated the analytical process described in the March 1995 draft Joint Venture (JV) Campaign Plan. The resulting analyses provide the basis for redesigning today's Warfighting Army for the 21st century. The combat unit elements, combat service elements, and the combat service support elements needed to be analyzed individually to determine whether or not each of these sections would be able to effectively perform under the given scenario conditions. TRAC-Lee was tasked to analyze the CSS capabilities of the three (3) division designs (Conservative Heavy, Strike, Brigadist) for DDA Phase III. The three division designs were dynamically gamed using the Vector-in-Commander model in the LANTICA III, Northeast Asia 2.0, and Southwest Asia 4.2 scenarios. The CSS elements represented in VIC were analyzed by TRAC-Lee with the primary focus of the analysis was on the maintenance and supply operations and how the CSS units functioned for the given scenario.

This analysis concluded that the CSS structure in the Strike Division can support the division during a 48-hour battle such as the one portrayed in LANTICA III scenario. There were a few problem areas in the CSS elements that were focused on in this analysis. The mechanics supporting two of the maneuver units within the division did not repair the workload generated by the scenario in a timely manner; moreover, some of the artillery units used all of their ammunition reserves and were not resupplied in a timely manner.

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STUDY TITLE: Combat Service Support (CSS) Vector-in-Commander (VIC) Analysis in Support of Force XXI Analyses Division Design Analysis – Phase III CSS Analysis of VIC Dynamic Gaming Strike Division Interim Design (LANTICA III)

PURPOSE: The purpose of this analysis was to produce quantitative analysis of the Strike Division Interim Design's combat service support (CSS) structure which was dynamically gamed in the LANTICA III scenario with the VIC model. The focus of the analysis was on the maintenance and supply operations and how the CSS units functioned for the given scenario.

MAIN ASSUMPTIONS: The principal assumptions of this study include: (a) all repair parts were available upon request, (b) Echelons-Above-Division (EAD) were fully resourced, and (c) CSS enablers and other technological equipment are present.

PRINCIPAL FINDINGS: The CSS structure in the Strike Division could support the division during the 48-hour battle in the LANTICA III scenario with a couple of exceptions. Two units within the division did not have adequate mechanic support to maintain the workload produced during the scenario. Several artillery units expended all of their ammunition resources at some time during the scenario and could not be resupplied in a timely manner.

IMPACT: This report suggests that the CSS structure in the Strike Division is sufficient to sustain the division in a scenario such as the one portrayed in LANTICA III.

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Combat Service Support (CSS) Vector-in-Commander
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Division Design Analysis -- Phase III CSS Analysis of VIC
Dynamic Gaming Strike Division Interim Design
(LANTICA III).
Technical Report



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Combat Service Support (CSS)
Vector-in-Commander (VIC) Analysis
in Support of Force XXI Analyses

Division Design Analysis -- Phase III
CSS Analysis of VIC Dynamic Gaming
Strike Division Interim Design (LANTICA III)
25Aug97 VIC Analysis Data

1. General.

a. The Commanding General (CG) Training and Doctrine Command (TRADOC) tasked the TRADOC Analysis Center (TRAC) to conduct an analysis of the Combat Service Support (CSS) Division redesign concept. TRAC at Fort Lee, Virginia (TRAC-LEE) used Vector-in-Commander (VIC) analysis to provide quantitative analysis of that concept.

b. The dynamic gaming with the VIC model is based on the LANTICA III scenario with a total duration of 48 hours incremented in four hour time periods (TP) and one (1) hour reorder cycle time between CSS units. The modeled force consists of two brigades with corps support. Specific descriptions and details for both the scenario and modeled force are provided in the main report.

c. The analysis focuses first on those key maneuver unit resources necessary for a unit to perform its designated mission. The specific resources addressed are weapon system availability and the timely availability of supplies. Secondly, various aspects of the CSS system are examined to isolate bottlenecks or shortages which limit the provision of needed services. And conversely, excesses or under-utilized CSS resources are identified for this scenario.

d. The analysis entails two major areas: maintenance support and supply support. Since the medical support system for the treatment of personnel is very similar in function to that of the maintenance system, medical support is addressed along with maintenance.

e. VIC unit name designators are used in this report for brevity. Appendix A shows the cross reference between actual unit names and VIC unit names.

2. Model Description.

a. The Vector-in-Commander (VIC) model is a two-sided, deterministic simulation of integrated land and air combat. The level of resolution is the maneuver battalion. As a deterministic model, VIC relies upon expected values; weapon systems, transporters, inventories/stockage levels, and consumption can be fractional values. VIC is event stepped for maneuver elements and both time stepped and event stepped for calculation of combat service support (CSS) effects. The combat and combat support (CS) functions in VIC produce a workload for the CSS system. Two key modules within VIC are used to represent the CSS system: Return to Duty (RD - maintenance) and Logistics (LO - supply).

b. The return-to-duty (RD) module operates on equipment and noncrew personnel, both of which are referred to as systems, as well as crews for key combat vehicles.

(1) Workloads. The attrition modules generate combat casualty workload in the form of combat-damaged systems. These quantities are adjusted to factor out catastrophic damage/killed in action (KIA) and abandonments (equipment only) before becoming a workload on the RD system. Reliability failures to equipment and disease and nonbattle injury (DNBI) to personnel are also generated, resulting in their removal from units and their introduction as workload upon the RD system.

(2) Processes. The RD module contains representations of the recovery, evacuation, and repair functions.

(a) Recovery is constrained by the availability of operational recovery vehicles. Recovery operations are represented as a delay time of 57 to 96 minutes which includes round trip travel, hook-up, and drop-off. The recovery time varies from vehicle to vehicle and the primary location of that vehicle.

(b) Evacuation is constrained by the availability of operational evacuation vehicles and dynamic evacuation times that are a function of distance and time on the main supply route (MSR) network.

(c) Repair is constrained by the available strength and type of assigned mechanics or medical personnel. Of course repair throughput is impacted by the 'time to repair' but repair time is determined by design factors and not CSS. A maintenance unit's maintenance man-hours (MMH) is degraded by fifty percent when that unit has to relocate on the battlefield. This degradation is calculated to the nearest quarter of an hour; therefore, a maintenance unit's MMH during a portion of a TP could be degraded while the remaining MMH are unaffected. The degradation of MMH availability is based on the premise that a maintenance facility will have only 50 percent of its assets (to include personnel) fully functioning at any time during a battlefield relocation.

(3) Products. The final product of the RD module is the return of crewed systems to owning units. Intermediate products of the various RD processes include recovered systems, evacuated systems, and repaired systems.

(4) Combat impacts on RD processes. Impacts include attrition of RD assets, productivity degradation due to unit movement, changes in evacuation distances due to unit movements, and changes in evacuation speeds due to congestion of MSR links.

c. The logistics (LO) module provides the support structure to facilitate the resupply of ammunition, fuel, and other supplies to maneuver units and the restocking of these supplies at supply units.

(1) Workloads. The attrition modules dynamically generate the workload for ammunition as units engage in conflict. As units move and change posture they create a workload for fuel. A workload for other supplies is generated by a daily consumption rate, depending upon unit types. When maneuver units deplete their basic loads to specified reorder levels, a requirement for resupply is levied on the CSS system.

(2) Processes. The LO module contains representation of the resupply and move functions. Resupply to maneuver units is constrained by the availability of resupply vehicles, availability of supplies at supply units, load times, and travel time between the unit and its supplier. The availability of supplies at supply points is constrained by transportation, availability of load facilities, and load/unload times. The move function is constrained by the availability of CSS trucks, congestion of the MSRs, and travel times between supply units.

(3) Products. The final product for the resupply and distribution system is the replenishment of expended ammunition, fuel, and other supplies to maneuver units. Intermediate products include the restocking of resupply units and the movement of supplies along the MSRs from higher echelon supply units.

(4) Combat impacts on LO processes. Attrition and movement of supply units as a result of combat effects degrade the ability of these units to perform their resupply function. Resources which can be lost at the supply units include resupply vehicles, stocks, and materiel-handling equipment (MHE). The relocation of supply units results in degradation of their receipt/issue capability during the move. In addition, attrition of resupply vehicles, both at the maneuver unit and along the MSRs, degrades the ability of the CSS system to deliver supplies.

3. Assumptions.

a. Maintenance characteristics and parameters of all systems remain constant across the scenario.

b. When damaged weapon systems reach a maintenance facility, the correct tools, parts, and equipment are present at the facility. If the number of mechanics necessary to work on the damaged weapon system is available, they will begin working on the damaged weapon system immediately (i.e., prep time and time spent for damage assessment are not played in the model).

c. The DNBI rate remains constant across the scenario.

d. Resupply of all stockage items is available from echelons above corps (EAC).

4. Sufficiency Criteria.

a. Equipment. Maintain 80 percent availability of systems that have not been destroyed or abandoned. Rationale: Army Regulation (AR) 220-1, Unit Readiness Reporting, defines an equipment availability status of 80-90 percent as category C2 which is fully combat ready with minor risk.

b. Personnel.

(1) Have no weapon systems in awaiting-reissue queue due to nonavailability of crews. Rationale: The availability of weapon systems crews affects the availability criterion for combat systems.

(2) Maintain 80 percent personnel strength level for all modeled personnel. Rationale: AR 200-1 defines a personnel strength level of 80-90 percent as category C2 which is combat ready with minor risk.

c. Supply. Have no zero balance of any supply-class subitem (e.g., 155mm, 120mm, POL). Rationale: The lack of a specific type could adversely affect tactical options.

5. Maintenance Analysis.

a. The six weapon system categories covered in this analysis are shown in table M-1. The Fixed Wing category was not represented in the CSS system. In addition, medical treatment of personnel and weapon system crews are presented as a separate category.

Category	Weapon System
TANK	M1A2
AFV	IFV/TOW FSV/45MM SFV/STINGER
ADA	AVENGER
MLRS	MLRS_D
CANNON	CRUSADER-D
HELICOPTERS	AH64D RAH66D

Key Weapon Categories
Table M-1

b. The primary maintenance performance measure at the maneuver unit level is availability of unit weapon systems. Availability of unit weapon systems is determined by the current strength of weapon systems at a maneuver unit versus the initial strength less the number of catastrophically killed weapon systems at the same maneuver unit. The number of weapon systems available is a function of many dependent and interdependent factors. These factors can be partitioned into two groups: (1) those factors which render weapon systems inoperable: combat damage and reliability and (2) factors that contribute to the return of repaired systems to combat. When more weapon systems are returned to combat, a larger population is available for combat and reliability failure, which in turn workloads the Return-to-Combat (RTC) support system.

(1) Factors which cause weapon systems to become inoperable are combat damage and reliability failures. Combat damage is a function of the interaction of opposing forces resulting in catastrophic kills and repairable battle damage. The percentage of catastrophic kills versus the percentage of repairables varies by weapon system due to threat weapons and survivability characteristics. Table M-2 shows the percent repairable for each system once combat damaged. The percentages are not measures of overall survivability but are conditional results based on a weapon system first being combat damaged. Overall survivability also involves the likelihood of a weapon system being acquired and then being hit by the enemy. The percentages in table M-2 are, therefore, predicated on the occurrence of these two events.

Category	Weapon System
M1A2	93
IFV/TOW	83
FSV/45MM	83
SFV/STINGER	83
AVENGER	69
MLRS_D	71
CRUSADER-D	49
AH64D	41
RAH66D	41

Percent Repairable by Weapon System
Table M-2

(2) Permanent losses of operational systems can occur in several ways. The most frequent is usually due to catastrophic combat damage. In addition, both types of candidate repairables (combat and reliability) are subject to weapon system abandonment at the maneuver unit or maintenance unit level. Maneuver and maintenance unit abandonments of weapon systems occur due to immediate war-fight conditions, thus becoming permanent losses like catastrophic kills (no systems were lost due to maintenance unit abandonments). Weapon systems can be traveling on an MSR when the scenario ends; thus these weapon systems are not considered part of a combat unit's arsenal. Another key factor which affects availability is the nonavailability of an owning unit. This occurs when a maintenance unit has repaired systems but does not have a maneuver unit in its area of influence with authorization to accept the system. In some cases, such weapons are never reissued during the scenario. Crewed weapon systems' RTC may be delayed because the appropriate number of crew members is not available to operate the weapon system. All five of these factors (catastrophic damage, abandonments, currently being reissued, unit non-availability, and weapon systems waiting crews) are independent of the CSS system performance. Table M-3 shows the number of systems for each of these categories at the end of the scenario.

Weapon	# Weapons Waiting Units	# Weapons Waiting Crews	# Weapons Being Reissued	Maneuver Unit Abandonments	Catastrophic Kills	Total
M1A2	0.0	1.2	1.0	0.1	3.4	5.7
IFV/TOW	0.0	0.0	2.0	0.0	14.4	16.4
FSV/45MM	0.0	10.4	0.0	0.0	7.3	17.7
SFV/STINGER	1.4	0.0	0.0	0.1	1.5	3.0
AVENGER	4.0	Not crewed	0.0	0.0	3.1	7.1
MLRS_D	0.0	0.0	0.0	0.0	0.5	0.5
CRUSADER-D	0.0	0.0	0.0	0.0	1.9	1.9
AH64D	0.0	0.0	2.0	0.0	5.4	7.4
RAH66D	0.0	0.0	5.4	0.0	3.3	8.7
Total	5.4	11.6	10.4	0.2	40.8	

Weapon System Losses
Table M-3

(3) Reliability failures are based on mean hours between failures (MHBf) for the major subsystems of each weapon. The major subsystems for this study are Automotive, Armament, Helicopter, and Medical. Of course, the subsystems that fail or are damaged vary by weapon systems (e.g., the M1A2 is composed of both subsystems, automotive and armament, while only automotive is represented for the heavy equipment transporter (HET)). Each subsystem is serviced by a different mechanic type. In addition, the MHBf can vary by subsystem for each weapon. Helicopters, for this analysis, are serviced by a single type master mechanic although both automotive and armament failures occur for helicopters. In addition, all wounded/DNBI personnel are treated by a single medical type. The availability and performance of trucks used for resupply is addressed in the supply section of the report.

(4) Factors which influence the RTC of weapon systems are recovery, evacuation, and repair (to include medical treatment of personnel and crews) resources. Each of the CSS resources which performs these services is subject to both combat damage and reliability failure, which determine their availability for weapon system processing and treatment of personnel. Recovery and evacuation are performed on a designated priority basis, while repair and treatment are based on a more complex priority system. Further complicating the impact of repair on weapon system RTC are the repair characteristics of individual weapon systems. These characteristics vary by level of repair (i.e., unit (ORG), direct support (DS), general support (GS)), and mean time to repair for each type repair (combat, reliability). These characteristics represent a very complex interrelated system which determines the number of operational weapon systems.

c. Analysis. The maintenance analysis is divided into three sections (Support Services Sufficiency, Key Weapon Availability, and CSS Workloads):

(1) Support Services Sufficiency.

(a) Recovery - Weapons.

1 Recovery operations serviced the recovery workload in a timely manner. "Timely manner" is defined as servicing the recovery workload within two TPs for a given maintenance unit. To meet this criterion the recovery workload at the end of one TP must be serviced in the next time period. The reason for this explanation of "timely manner" is to account for the maximum time of 96 minutes it takes for a recovery vehicle to assist in the recovery of a damaged weapon system or vehicle. If a vehicle requires an assisted recovery during the last half of the current TP, that vehicle would not reach the designated maintenance area until the next TP. The two recovery vehicles modeled are the improved recovery vehicle (M88) and a generic recovery vehicle (HMTWRECKER) which represent all other recovery vehicles which are not M88s. Table M-4 provides an overview of both recovery vehicle's status for the scenario where:

Initial Strength (stgn) is the assigned density at the start of the scenario.

End Strength (stgn) is the number operational at the end of the scenario.

End Availability is the percentage of initial strength available less the number destroyed or abandoned at the end of the scenario.

M88				HMTWRECKER			
Unit ID	Initial Stgn	End Stgn	End Availability	Unit ID	Initial Stgn	End Stgn	End Availability
B000000	31	29.4	95	B000000	16	16.0	100
B2000AR	27	25.4	94	B2000AR	20	20.0	100
B2000EN	4	3.6	91	B2000EN	2	2.0	100
B2010MX	5	4.5	90	B2010MX	7	6.9	99
B2011MX	6	5.4	90	B2011MX	3	3.0	100
B2012MX	6	5.4	90	B2012MX	3	3.0	100
B2013AR	6	5.4	90	B2013AR	3	3.0	100
B2014AR	6	5.4	90	B2014AR	3	3.0	100
B2020MX	5	4.5	90	B2020MX	7	7.0	100
B2021AR	6	5.4	90	B2021AR	3	3.0	100
B2022AR	6	5.4	90	B2022AR	3	3.0	100
B2023MX	6	5.4	90	B2023MX	3	3.0	100
B2024MX	6	5.4	90	B2024MX	3	3.0	100
B20300H	1	0.9	90	B20300H	3	3.0	100
B2030DC	6	5.5	92	B2030DC	5	5.0	99
				B203A0H	2	2.0	100
				B203R0H	2	2.0	100
				B203U0H	2	2.0	100

M88 and HMTWRECKER Ending Availabilities
Table M-4

The "end availability" is a reliable indicator of availability and recovery support throughout the scenario. Table M-5 provides the combined recovery operations for all divisional maintenance units by TP.

TP	1	2	3	4	5	6	7	8	9	10	11	12
# RECOV.	20.3	26.3	24.3	23.8	31.4	52.5	65.6	39.9	24.7	22.2	27.2	24.4
WAITING RECOV.	5.6	5.7	5.6	5.4	15.3	6.8	13.0	6.0	5.2	6.0	7.1	6.6

Recovery Operations for All Divisional Maintenance Units
Table M-5

Maintenance				Maintenance			
		Recovered by				Recovered by	
Unit	HMTWRECKER	M88	TOTAL	Unit	HMTWRECKER	M88	TOTAL
B000000	189	254	444	B2021AR	18	0	18
B2000AR	74	35	109	B2022AR	20	0	20
B2000EN	58	1	60	B2023MX	7	0	7
B2010MX	4	24	28	B2024MX	16	0	16
B2011MX	19	0	20	B20300H	7	1	8
B2012MX	15	0	16	B2030DC	29	4	33
B2013AR	9	2	11	B203A0H	0	0	0
B2014AR	9	0	10	B203R0H	0	0	0
B2020MX	3	24	27	B203U0H	0	0	0

Recovery Workload (by M88 and HMTWRECKER)

Table M-6

2 Table M-6 lists the recovery workload for all maintenance units by recovery vehicle type.

3 Conclusion:

Recovery is not a constraint on weapon system RTC.

(b) Recovery - Personnel.

The recovery of injured personnel is implied; therefore, injured personnel do not require a recovery vehicle for transport from the battlefield to a medical facility. This phenomenon negates the possibility of a backlog of injured personnel needing recovery. Hence, personnel RTC will never be impeded by recovery assets.

(c) Evacuation - Weapons.

1 Evacuation support is performed in the scenario by HETs and a generic evacuation vehicle. The purpose of the generic evacuation vehicle is to represent the backhaul capability of other transporters. The analysis focuses on the HETs because they are considered potential constraints on evacuation. All but three of the key weapon systems utilize HETs for evacuation. The exceptions are AH64D, RAH66D, and the AVENGER. Only the performance of HETs is addressed. Weapon system evacuations are performed in a "timely manner" if damaged weapon systems are evacuated to the designated area (corps or division) within two TPs of the sustained damage.

2 Evacuation in this scenario is supported at the division area/CSB(DS) (unit B2000AR) and at the corps rear area (unit B000000) with 24 and 30 HETs assigned, respectively. Evacuations occur for two reasons:

- designation of maintenance support at higher support levels.
- lengthy clockhour repair times (any vehicle or weapon system that requires more than seven clockhours to repair will be sent to the corps support area (forward) so it will not 'tie up' mechanics at the ORG level with maintenance work that requires a considerable amount of time).
- maintenance overflow (maintenance overflow occurs when the number of hours needed to repair awaiting weapon systems exceeds a maintenance man hour threshold set for a maintenance unit).

3 Across the scenario, a maximum of two percent of the corps area's HETs and two percent of the division area's HETs were not available at any given TP, all due to RAM damage.

4 There were 68 vehicle and weapon system evacuations to the corps area which required a HET (refer to table M-7). These vehicles and weapon systems included 24 IFV/TOWs, 15 AVLBs, 8 M1A2s, 8 M88s, 6 CRUSADERS, 2 MLRS, and 1 FARV. As early as TP 4, the corps rear area had problems evacuating damaged vehicles and weapon systems from below division. Time period 7 saw the greatest number of vehicles and weapon systems (24) waiting to be or in the process of being evacuated to the corps area. Some of these systems were 15 IFV/TOWs, 3 AVLBs, 2 M1A2s, 2 M88s, and 1 CRUSADER.

TP	1	2	3	4	5	6	7	8	9	10	11	12
Number Evac'd	2.1	4.9	3.0	3.3	3.8	7.3	10.1	8.7	7.3	6.5	5.9	5.7
Awaiting Evac	2.6	3.1	4.4	5.8	9.7	17.6	24.1	21.5	18.9	16.9	16.3	15.5

Evacuation Workload - Corps Rear Area
Table M-7

5 There were 49 vehicle and weapon system evacuations to the CSB(DS) which required a HET (refer to table M-8). These 49 vehicles and weapon systems were 28 AVLBs, 4 M1A2s, and 1 M88. There was a slight build-up of vehicles and weapon systems from TP 9 on, but this indicates that these systems were in the process of being evacuated but have not reached their destination point, the CSB(DS).

TP	1	2	3	4	5	6	7	8	9	10	11	12
Number Evac'd	2.2	4.9	3.7	1.8	3.8	9.4	1.6	13.2	2.6	2.4	1.4	2.0
Awaiting Evac	0.3	2.0	1.5	2.1	4.1	2.8	4.1	3.3	3.4	3.3	3.2	3.1

Evacuation Workload - CSB(DS) Area
Table M-8

6 Conclusion:

Evacuations to the corps rear area constrained weapon system RTC. Since the corps rear HETs had a 98 percent availability level for the entire scenario; distance was the main factor in these systems not being evacuated in a "timely manner."

(d) Evacuation - Personnel.

1 Injured personnel evacuation is performed in the scenario by ambulance. Injured personnel have to be evacuated to a higher echelon for treatment when they have sustained either combat damage or DNBI of a severe nature. Personnel evacuations are performed in a "timely manner" if the injured personnel are evacuated within two TPs of the sustained injuries. An ambulance can transport four injured personnel at a time.

2 The corps rear area has 50 ambulances and the CSB(DS) has 12 ambulances for personnel evacuations. Damage to the ambulances is negligible during the course of the scenario.

3 As shown in table M-9, the number of injured personnel waiting for ground evacuation increased to 433 at TP 7 and continued to increase throughout the remaining TPs of the scenario. Approximately 386 personnel evacuations to the corps rear area occurred during this scenario. At the evacuation rate of 44 per TP, it would take over 39 hours to evacuate these 433 injured personnel.

TP	1	2	3	4	5	6	7	8	9	10	11	12
Number Evac'd	20	32	21	22	28	37	44	38	36	36	36	36
Awaiting Evac	11	20	29	37	66	79	433	437	444	442	596	598

Personnel Ground Evacuation Workload - Corps Rear Area
Table M-9

4 The ambulances at the CSB(DS) handled the workload produced by this scenario.

5 Conclusion:

The ambulances dedicated to the corps rear area could not evacuate the number of personnel injured during this scenario.

(e) Repair - ground based weapons.

1 Sufficient repair support is determined by the availability of required mechanic types at the supporting maintenance facility for ORG/DS and GS levels. For the most part, FORCE XXI mechanics in the DISCOM are modular in that they can repair both ORG and DS level damaged vehicles and weapon systems. Table M-10 shows, for assigned ORG/DS level mechanics, the maximum MMH percentage utilized for each of the 18 maintenance facilities across the scenario. When this percentage is 100 sufficient mechanics were not available to service the workload (note shaded cells) at some point during the scenario.

Unit Name	Armament		Automotive		Helicopter		Medical	
	Util. %	Str.	Util. %	Str.	Util. %	Str.	Util. %	Str.
B2000AR	54	47	55	109			100	34
B2000EN	0	9	60	33			100	3
B2010MX	54	32	52	48			32	24
B2011MX	100	20	100	38			47	21
B2012MX	68	20	65	38			51	21
B2013AR	28	20	19	45			80	10
B2014AR	26	20	19	45			80	10
B2020MX	30	32	44	48			32	24
B2021AR	100	20	84	45			80	10
B2022AR	100	20	100	45			94	10
B2023MX	21	20	18	38			46	21
B2024MX	100	20	70	38			46	21
B20300H	0	1	38	6	16	24	100	3
B2030DC	100	15	100	23			32	25
B2030IN	100	1	100	1			100	8
B203A0H	0	1	12	6	27	41	100	3
B203R0H	0	1	10	6	28	21	100	3
B203U0H	0	1	8	6	13	39	100	3

Utilization and Initial Strength by ORG/DS Level Mechanics
Table M-10

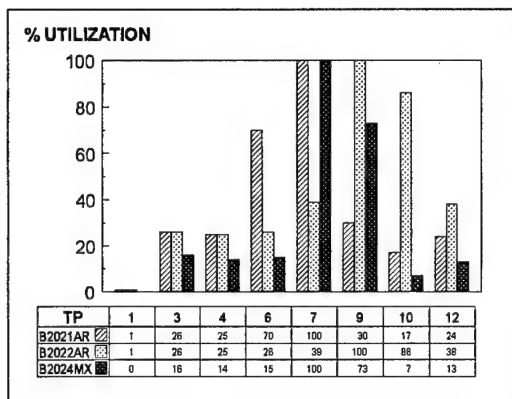
2 There is one exception to the above described 100 percent indicator - maintenance backlog overflow. Resource status is reported only at the end of a TP thus making it possible that 100 percent utilization occurred within the TP but shows less at the end of the TP due to completion or repairs. So the condition can exist where the ending TP utilization is less than 100 percent but within a TP conditions existed that caused maintenance backlog overflow.

3 In general, for those facilities with less than 100% utilization at the end of a TP, sufficient maintenance resources were always available. There were only minor exceptions when very small fractional workloads were evacuated due to backlog status and the MMH utilization was not 100%. Any under-utilized resources are not necessarily "excesses" but are indicators of the magnitude of the workload for this scenario. Force structure implications are not addressed in this report.

4 Figures M-1 through M-4 show the MMH utilization by mechanic type for those maintenance units with 100 percent utilization.

a Six maintenance facility's ORG/DS level armament mechanics were 100 percent utilized: B2011MX, B2021AR, B2022AR, B2024MX, B2030DC, and B2030IN.

- The utilization of the 2nd brigade's FSCs can be found in Figure M-1.



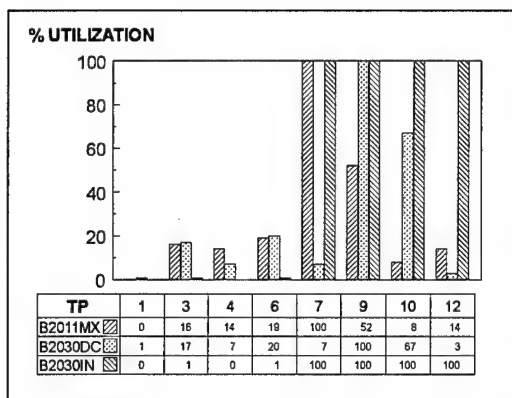
ORG/DS Level Armament Mechanic Utilization
for the FSCs of the 2nd brigade
Figure M-1

- The armament mechanics in the 1st armor battalion's FSC were fully utilized in TP 7. No vehicles or weapon systems had to be recovered to the 2nd brigade's BSC because of maintenance overflow. At the end of TP 7, two IFV/TOWs and one FSV/45MM were waiting for armament mechanics to become available at this FSC.

- Maximum utilization of the armament mechanics at the 2nd battalion's FSC occurred at TP 9. One IFV/TOW and one M1A2 were waiting for armament repair at the end of TP 9. No maintenance overflow occurred at this FSC because of a shortage of armament mechanic manpower hours.

- The armament mechanics supporting the 4th mechanized infantry battalion were fully utilized in TP 7. No vehicles or weapon systems had to be recovered to the 2nd brigade's BSC because of maintenance overflow. At the end of TP 7, five IFV/TOWs and one M1A2 were waiting for armament mechanics to become available at this FSC.

- The armament mechanics that reached 100 percent utilization at other maintenance facilities can be found in Figure M-2.



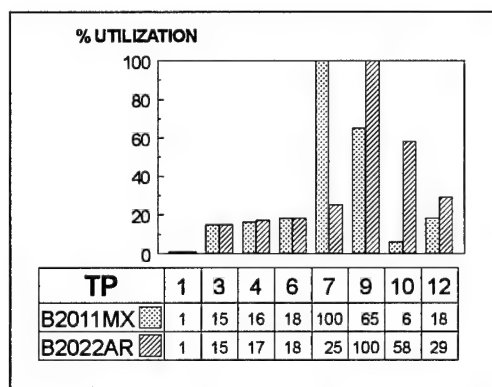
ORG/DS Level Armament Mechanic Utilization for the FSCs
supporting unit B2011MX, B2030DC, B2030IN
Figure M-2

- The armament mechanics at the 1st brigade's 1st armor battalion's FSC were fully utilized in TP 7. One IFV/TOW and one M1A2 had to be recovered to the 2nd brigade's BSC because of maintenance overflow. At the end of TP 7, four IFV/TOWs were waiting for armament mechanics to become available at this FSC.

- Maximum utilization of the armament mechanics supporting the division cavalry squadron occurred at TP 9. One M1A2 was waiting for armament repair at the end of TP 9. Maintenance overflow occurred at this facility with four FSV/45MMs and five M1A2 having to be recovered to the division area.

- The armament mechanics at the light infantry battalion's FSC were fully utilized from TP 7 on. No vehicles or weapon systems had to be recovered to the division area because of maintenance overflow.

b Four maintenance facility's ORG level automotive mechanics were 100 percent utilized (see figures M-3 & M-4): units B2011MX, B2022AR, B2030DC, and B2030IN.



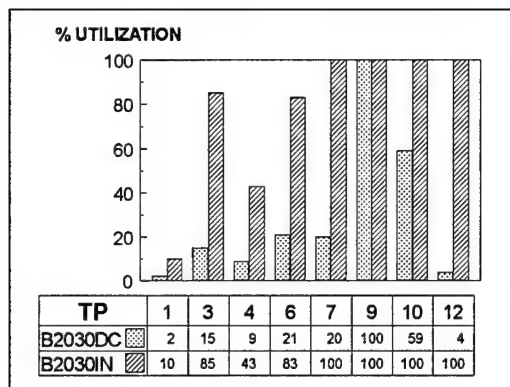
ORG/DS Level Automotive Mechanic Utilization for the
FSCs Supporting Units B2011MX and B2022AR
Figure M-3

- The automotive mechanics in the 1st brigade's 1st armor battalion's FSC were fully utilized in TP 7. No vehicles or weapon systems had to be recovered to the 2nd brigade's BSC because of maintenance overflow. At the end of TP 7, four IFV/TOWs and four FSV/45MM were waiting for automotive mechanics to become available at this FSC.

- Maximum utilization of the automotive mechanics at the 2nd brigade's 2nd battalion's FSC occurred during TP 9. Two HMMWVs, one IFV/TOW, one M1A2, and one LMTV were waiting for armament repair at the end of TP 9. No maintenance overflow occurred at this FSC because of a shortage of automotive mechanic manpower hours.

- Maximum utilization of the automotive mechanics supporting the division cavalry squadron occurred at TP 9. Three LMTVs, two FSV/45MMs, two HMMWVs, and one B10AMMO were waiting for automotive repair at the end of TP 9. Maintenance overflow occurred at this unit with thirteen FSV/45MMs and eight M1A2 having to be recovered to the division area.

- The automotive mechanics at the light infantry battalion's FSC were fully utilized from TP 7 on. No vehicles or weapon systems had to be recovered to the division area because of maintenance overflow.



ORG/DS Level Automotive Mechanic Utilization for the
Maint Facilities Supporting Units B2030DC and B2030IN
Figure M-4

c Table M-11 shows the DS level mechanic utilization at the CSB(DS) and the DS level helicopter mechanic utilization for the CSB(DS).

Unit Name	Armament		Automotive		Helicopter		Medical	
	Util. %	Str.	Util. %	Str.	Util. %	Str.	Util. %	Str.
CSB(DS)	60	20	100	36	20	22	56	25

Utilization and Initial Strength by DS Level Mechanics
Table M-11

- The automotive mechanics at the CSB(DS) were 100 percent utilized from TP 7 on. The largest buildup of unserviced weapon systems occurred during TP 12 with 14 IFV/TOWs, 13 MLRS, 11 M88s, 2 M1A2s, 2 CRUSADERS, 2 FARVs, and 1 SFV/STINGER. So with 36 automotive mechanics, the CSB(DS) had difficulties with the workload produce during this scenario.

Conclusion:

Within the DISCOM, there was an insufficient number of armament and automotive mechanics supporting the division cavalry squadron, and the armament mechanics at the FSC supporting the 1st mechanized infantry battalion of the 1st brigade could not handle the workload produced during this scenario.

(f) Repair - helicopters.

Note: The AH64D (Apache) and the RAH66D (Comanche) are the systems represented by the helicopter weapon system category.

1 Sufficient helicopter repair support is determined by the availability of required helicopter mechanics at the supporting maintenance facility. The number of helicopter mechanics assigned to the helicopter battalions, the corps area, and division area can be found in tables M-10 through M-11. Note from these tables that none of the helicopter maintenance facilities had their mechanics 100% utilized during any TP of the scenario.

2 Recovery - The AH64D and the RAH66D do not require assisted recovery. If one of these helicopters receives non-catastrophic damage, that helicopter is assumed to self-recover. Helicopter RTC will never be impeded by recovery assets.

3 Evacuation - The AH64D and the RAH66D do not require a HET for evacuation. Instead, a generic evacuation vehicle is used to evacuate AH64Ds and RAH66Ds. The availability of HETs does not hamper the process of helicopter evacuation.

4 Conclusion:

None of the three CSS assets (recovery, evacuation, and repair) restricted helicopter RTC during the scenario.

(g) Medical treatment.

Note: Medical treatment excludes the personnel category of crew.

1 Personnel can be in one of the following three categories: combat ready, medical treatment process, or KIA. When injured personnel arrive at a medical facility, they receive treatment immediately, have to wait for the next available medic, or have to be evacuated to a higher echelon because of the severity of the wound. After treatment, injured personnel are returned to their respective unit. At TP 12, the theater's Blue troop force was at 94%, its lowest availability during any TP of the scenario (the blue troop strength at TP 12 was less than that of TP 11 by .15 percentage points). The KIA column is the accumulative blue troop losses over the scenario.

TP	Combat Ready	Being Treated	KIA	% AVAIL
0	19,400	0	0	100
1	19,327	73	0	100
2	19,216	179	5	99
3	19,207	188	5	99
4	19,190	205	5	99
5	19,079	311	10	98
6	19,066	323	11	98
7	18,528	674	197	96
8	18,428	772	200	96
9	18,419	780	200	96
10	18,394	804	202	96
11	18,053	1,057	289	94
12	18,035	1,072	294	94

Theater Personnel Profile
Table M-12

2 During the course of the scenario, the majority of personnel that are not combat ready are being treated or awaiting treatment at the corps rear area (at TP 12, 418 of the 1,072 personnel being treated were at the corps rear area.) When injured personnel have to be evacuated to corps, their severe injuries take approximately six days to treat; therefore, those persons will not return to duty for the remaining part of the scenario.

3 While the combined totals of the theater's Blue troop forces always remained above the 80% availability sufficiency criterion, three units (units B2022AR, B2030IN, and B2033DC) fell below this criteria for two or more consecutive TPs. These units are listed in table M-13 along with their troop combat availability percentage. The increase of combat intensity in the later part of the scenario and the treatment time of injured troops evacuated to the corps area are the two factors that contribute to the low troop availability at these units.

TP	1	2	3	4	5	6	7	8	9	10	11	12
B2022AR	100	99	99	99	99	99	70	70	71	70	70	70
B2030IN	100	99	99	99	99	98	34	34	35	36	36	36
B2033DC	100	99	99	99	98	98	69	69	71	72	72	71

Percentage of Personnel Available
Table M-13

4 Conclusion:

Medical repair teams organic to echelons lower than division did not constrain personnel RTC.

(2) Key Weapon Availability.

(a) Up to this point the analysis has addressed individual CSS support services (recovery, evacuation, repair, medical treatment) and their impact on RTC. With the exceptions noted, for the most part each of these support services was sufficient for the available workloads.

(b) The following section of the report, in effect, examines the cumulative effects of CSS services by looking at the availability of key weapons. Tables M-15 through M-23 provide unit level overviews for each key weapon system.

1 Each table (M-15 through M-23) contains the following information:

- Initial Strength (stgn) - weapon system density at the start of the scenario.
- End Strength (stgn) - weapon system density at the end of the scenario.
- Permanent Losses (K-kills) - catastrophic kills and abandonments.
- End % availability - weapon system availability at the end of the scenario.

This availability calculation excludes permanent losses in conformance with the earlier described sufficiency criteria. Permanent losses are excluded because their occurrence are independent of how well (or lack thereof) CSS performs.

2 Two phenomena appearing in the following tables warrant discussion:

a A "dead unit" is indicated when the "end strength" and "availability" are zero. A "dead unit" occurs when significant unit resources are decimated and that unit can no longer effectively function. Its surviving resources, damaged and undamaged, are distributed to repair or other units requiring weapons, respectively. The row in each table for dead units is shaded.

b One would expect the "end strength" to always be smaller than initial strength if there were permanent losses. This is not always the case because of the need based reissue of repaired (and crewed) weapons. Depending on the current available strength of a weapon, reissues are distributed proportionally higher to those units with the greatest need (lowest current strength) and not to the unit which originally "owned" the weapon.

(c) Results:

1 All weapon systems meet the availability sufficiency criteria (80%) except for the following cases:

- The ending availability of the IFV/TOWs at the following units was below the 80 percent mark: B2010MX (0 percent), B2011MX (69 percent), B2021AR (70 percent), and B2024MX (72 percent). Unit B2010MX had one IFV/TOW in the process of being reissued and one IFV/TOW being repaired at the conclusion of TP 12. When these two IFV/TOWs are returned to their owning unit, the availability will be above 89 percent. The main reason for unit B2011MX not maintaining a 80 percent availability strength was that 22 IFV/TOWs sustained combat damage midway through the scenario and thus a large percent of this unit's IFV/TOWs were not reissued. Units B2021AR and B2024MX received a substantial amount of combat damage at about the same time as unit B2011MX; thus, they had a similar IFV/TOW availability at the end of the scenario. Another reason for the low ending availability at these units was that 14 IFV/TOWs were waiting to be repaired at the CSB(DS).

- The ending availability of the FSV/45MMs at the following unit was below the 80 percent mark: B2021DC (0 percent). Nine of unit B2021DC's FSV/45MMs received combat damage during TP 8, and by the end of the scenario ten FSV/45MMs were combat ready but did not have a crew to operate these systems.

2 The following table lists the units that were rendered combat ineffective ("dead") during the scenario, the time that the unit became ineffective, and the major weapon system(s) organic to that unit.

Ineffective "Dead" Unit	Time	Major Weapon Systems
B201CA1	20.1	SFV/STINGER
B201DA1	20.07	AVENGER
B003JA1	23.23	AVENGER
B003KA1	27.17	AVENGER

Units Rendered Combat Ineffective During the Scenario
Table M-14

3 Conclusion:

The CSS system did not constrain weapon system availability.

Reference (b).1). of Section (2), Key Weapon Availability -- end % availability is the weapon system availability at the end of the scenario. This availability calculation excludes permanent losses in conformance with the earlier described sufficiency criteria. Permanent losses are excluded because their occurrence is independent of how well (or poorly) CSS performs.

Unit ID	Initial Stgn	End Stgn	K-Kills	End # Avail
B2011MX	14	11.5	0.6	86
B2012MX	14	12.8	0.4	94
B2013AR	30	28.6	0.0	95
B2014AR	30	28.6	0.0	95
B2021AR	30	28.2	0.4	95
B2022AR	30	27.8	0.6	95
B2023MX	14	13.3	0.0	95
B2024MX	14	13.0	0.4	95
B2031DC	9	7.8	0.6	93
B2032DC	9	8.0	0.4	93
B2033DC	9	7.7	0.2	88
Total Permanent Losses			3.5	

MIA2 Status
Table M-15

Unit ID	Initial Stgn	End Stgn	K-Kills	End # Avail
B2010MX	3	0.0	0.5	0
B2011MX	30	17.9	4.1	69
B2012MX	30	24.3	1.8	86
B2013AR	14	13.3	0.1	95
B2014AR	14	13.5	0.0	96
B2020MX	3	2.9	0.0	96
B2021AR	14	8.2	2.3	70
B2022AR	14	11.3	0.9	86
B2023MX	30	28.5	0.2	96
B2024MX	30	18.2	4.6	72
Total Permanent Losses			14.4	

IFV/TOW Status
Table M-16

Unit ID	Initial Stgn	End Stgn	K-Kills	End # Avail
B201AA1	4	3.9	0.0	99
B201CA1	4	0.0	1.5	0
B201EA1	4	4.0	0.0	99
B201JA1	4	3.9	0.0	98
Total Permanent Losses			1.6	

SFV/STINGER Status
Table M-17

Unit ID	Initial Stgn	End Stgn	K-Kills	End % Avail
B2011DC	13	11.3	1.4	97
B2011MX	6	5.3	0.6	99
B2012MX	6	5.7	0.2	99
B2013AR	6	6.0	0.0	100
B2014AR	6	6.0	0.0	100
B2021AR	6	5.5	0.5	100
B2021DC	13	0.0	2.1	0
B2022AR	6	5.9	0.1	99
B2023MX	6	6.0	0.0	100
B2024MX	6	6.0	0.0	100
B2030DC	2	1.9	0.1	99
B2031DC	9	7.9	1.1	100
B2032DC	9	8.0	1.0	100
B2033DC	9	8.6	0.2	98
Total Permanent Losses			7.3	

FSV/45MM Status
Table M-18

Unit ID	Initial Stgn	End Stgn	K-Kills	End % Avail
B201BA1	6	5.7	0.6	100
B201DA1	6	0.0	1.8	0
B201FA1	6	5.9	0.0	99
B201GA1	6	5.9	0.0	98
B201HA1	6	5.7	0.4	100
B201IA1	6	5.9	0.0	98
B201KA1	6	5.7	0.3	100
B201LA1	6	5.9	0.0	98
Total Permanent Losses			3.1	

AVENGER Status
Table M-19

Unit ID	Initial Stgn	End Stgn	K-Kills	End % Avail
B200GM2	9	8.4	0.1	94
B200HM2	9	8.5	0.0	95
B200IM2	9	7.8	0.4	90
Total Permanent Losses			0.5	

MLRS D Status
Table M-20

Unit ID	Initial Stgn	End Stgn	K-Kills	End % Avail
B200AH2	8	6.3	0.6	84
B200BH2	8	7.0	0.0	87
B200CH2	8	6.0	1.0	85
B200DH2	8	7.0	0.0	88
B200EH2	8	7.0	0.0	88
B200FH2	8	6.5	0.3	85
Total Permanent Losses			1.9	

CRUSADER-D Status
Table M-21

Unit ID	Initial Stgn	End Stgn	K-Kills	End % Avail
B203A0H	15	5.0	5.2	51
B203R0H	15	10.9	0.2	73
Total Permanent Losses			5.4	

AH64D Status
Table M-22

Unit ID	Initial Stgn	End Stgn	K-Kills	End % Avail
B203A0H	8	3.4	2.7	63
B203G0H	8	5.4	0.0	67
B203R0H	8	3.2	0.6	43
Total Permanent Losses			3.3	

RAH66D Status
Table M-23

(3) CSS Workloads. The following CSS workloads are provided to show the type and magnitude of workload serviced by each unit.

(a) Recovery and evacuation vehicle workload. The second column in table M-24 indicates the number of vehicles that required assisted recovery from their owning unit. The third through sixth columns show the number of vehicles that required evacuation 'in' and 'out' of a higher echelon maintenance unit. Also indicated is whether or not the vehicle required a HET for evacuation.

Maint Unit	Total # of assisted recoveries		# EVAC'D IN		# EVAC'D OUT	
	HMTWRECKER	M88	TOTAL	w/ HET	TOTAL	w/ HET
B000000	254.4	189.2	86	68.1	0	0
B2000AR	35.4	73.6	72	47	77.6	68.1
B2000EN	1.2	58.3			16.9	16.9
B2010MX	27.3	7.1			0	0
B2011MX	0.4	19.3			3.3	3.3
B2012MX	0.4	15.2			0	0
B2013AR	1.6	9.2			0	0
B2014AR	0.5	9			0	0
B2020MX	23.9	2.9			0	0
B2021AR	0.5	17.9			0	0
B2022AR	0.4	19.9			0	0
B2023MX	0.3	7.5			0	0
B2024MX	0.5	15.6			0	0
B20300H	1.1	6.5	5.7	0	10.7	2.3
B2030DC	3.5	29.1			50.2	27.8
B2030IN	0	0			2.6	0
B203A0H	0.5	0			0	0
B203R0H	0.5	0			5.7	0
B203U0H	0.3	0			0	0

Recovery and Evacuation Workload
Table M-24

(b) Medical team workload. Table M-25 shows the number of personnel that arrived at a medical facility during the scenario due to combat and non-combat DNBI actions. The last column displays the number of treatment man hours expended by all medical teams.

MEDICAL UNIT	CBT MEDICAL RECOVERED	DNBI MEDICAL RECOVERED	MMH EXPENDED	MEDICAL UNIT	CBT MEDICAL RECOVERED	DNBI MEDICAL RECOVERED	MMH EXPENDED
B000000	96.47	201.08	3,612.5	B2022AR	6.3	28.82	70.33
B2000AR	624.83	646.33	334.85	B2023MX	0.03	39.45	85.73
B2000EN	0.33	48.95	58.98	B2024MX	0.67	39.39	87.3
B2010MX	0.63	31.2	68.5	B20300H	5.29	17.47	48.08
B2011MX	2.38	38.99	88.79	B2030DC	2.37	29.69	67.77
B2012MX	4.72	38	89.23	B2030IN	5.5	31.16	60.42
B2013AR	0.93	32.76	71.66	B203A0H	4.66	21.55	38.42
B2014AR	0	32.88	71.13	B203R0H	0.58	18	28.87
B2020MX	0.25	30.33	66.8	B203U0H	0	19.68	43.67
B2021AR	0.42	32.87	72.05				

Medical Unit Workload
Table M-25

(c) Maintenance team workload. Table M-26 shows the number of vehicles (both ground and air) that were recovered to a maintenance facility during the scenario. The last four columns display the number of maintenance man hours expended on ground and air vehicles and the estimated number of maintenance man hours required at TP 6 to repair all vehicles at the maintenance facilities.

MAINT UNIT	# VEHICLES RECOVERED		GROUND VEHICLES		HELICOPTERS	
	CBT DAMAGE	RAM DAMAGE	MMH EXPENDED	MMH NEEDED	MMH EXPENDED	MMH NEEDED
B2000AR	665.9	814.7	408.4	9.2		
B2000EN	0.6	123.8	253.9	74.7		
B2010MX	18.6	76.3	109.7	5.0		
B2011MX	36.2	55.9	175.3	3.5		
B2012MX	24.7	56.6	142.7	5.1		
B2013AR	7.5	54.9	102.8	16.0		
B2014AR	0.5	55.1	103.0	4.9		
B2020MX	22.5	74.1	113.1	1.5		
B2021AR	23.3	53.9	180.3	4.4		
B2022AR	39.0	49.9	205.8	5.4		
B2023MX	0.9	58.9	76.5	4.3		
B2024MX	24.7	57.0	161.3	4.3		
B20300H	5.3	41.9	30.1	9.2	38.5	0.4
B2030DC	65.6	51.1	112.0	4.8		
B2030IN	26.5	38.0	9.9	31.6		
B203A0H	4.8	42.1	4.6	0.1	53.2	0.2
B203R0H	0.6	40.9	3.7	0.1	36.8	0.2
B203U0H	0.0	27.6	3.4	0.1	34.5	3.7

Maintenance Unit Workload
Table M-26

(4) Observations.

- 1) Evacuations to the corps rear area constrained weapon system RTC. Since the corps rear HETs had a 98 percent availability level for the entire scenario; distance was the main factor in these systems not being evacuated in a "timely manner."
- 2) The ambulances dedicated to the corps rear area could not evacuate the number of personnel injured during this scenario.
- 3) Within the DISCOM, there was an insufficient number of armament and automotive mechanics supporting the division cavalry squadron, and the armament mechanics at the FSC supporting the 1st mechanized infantry battalion of the 1st brigade could not handle the workload produced during this scenario.

6. Supply Analysis.

a. This analysis assesses the CSS system's capability to support combat and combat support units for the defined scenario. The CSS units must fill requests for replenishment stockages in a "timely fashion;" failure to do so can be attributed to lack of transporters, lack of stockages, long order-to-delivery times, or a combination of the three.

b. Analysis. This analysis is structured into two parts: supply class III and supply class V.

(1) Supply Class III.

(a) Requirement. For the scenario, the requirement for class III (petroleum) was found by summing the consumption (quantities "used" plus quantities "lost") of all maneuver units (CSS units were excluded from this computation) during each TP.

Calculated in "gallons (gals)," the requirement for class III for the length of the scenario is presented in table L-1.

The consumption of supplies generates a requirement for stocks of supply types as well as transportation assets to deliver the replenishments to maneuver unit stockages. Consumption is translated into an order for materiel. Each order levies upon the CSS system a requirement for existing stocks and transportation assets. The authorized amount declines with time due to the attrition of weapon systems. Each weapon system has an authorized amount of specific supply types, and the authorized stockage is reduced as systems are killed. Table L-1 identifies the area of operation (AO) stockage levels and activities for class III: 1) amounts used; 2) amounts lost; and 3) amounts consumed (the requirement).

TP	USED GALS	LOST GALS	REQUIREMENT CONSUMED
0	0	0	0
1	108,781	30	108,811
2	97,047	85	97,132
3	69,748	8	69,756
4	69,314	0	69,314
5	47,099	841	47,940
6	123,504	2,112	125,616
7	84,554	3,496	88,050
8	33,573	1,297	34,870
9	19,498	153	19,651
10	53,650	56	53,706
11	59,535	258	59,793
12	23,047	259	23,306
TOTAL	789,350	8,594	797,944

Consumption of Class III, GALS
Table L-1

(b) Discussion. The resupply options for maneuver units are: 1) resupply is unnecessary (Balance on Hand $\geq 75\%$ of Authorized); 2) standard resupply (Balance on Hand $\geq 50\%$ & $< 75\%$ of Authorized); or 3) emergency resupply (Balance on Hand $< 50\%$ of Authorized); reference Appendix B for definitions of "standard" and "emergency" resupply. Table L-2 indicates the number of maneuver units by TP with a BOH so low as to warrant the use of either standard or emergency resupply.

RESUPPLY	TP												
	0	1	2	3	4	5	6	7	8	9	10	11	12
RESUPPLY UNNEC	109	99	71	84	75	99	73	82	91	97	69	86	91
STANDARD RESUPPLY	0	10	35	24	30	9	28	18	9	4	32	14	10
EMERGENCY RESUPPLY	0	0	3	1	4	1	5	4	4	2	2	3	2
ALL UNITS ¹	109	109	109	109	109	109	106	104	104	103	103	103	103

¹ COMBAT INEFFECTIVE (DEAD) UNITS ARE NOT INCLUDED.

Number of Maneuver Units Needing Resupply, Class III
Table L-2

For more detail on individual units requiring resupply see table L-3 below. These units wait an average of 4.5 TPs (median of 4 TPs) before their BOH returns to a level no longer requiring resupply of class III.

Unit	TP													#TPs
	0	1	2	3	4	5	6	7	8	9	10	11	12	
B000000					72	73	74			70	72	74		6
B0001EN											71	70	65	3
B0002EN													71	1
B0008EN											73	72	68	3
B00A1M2			69		72									2
B00A2M2			68		71		74	59			69			5
B00A3M2			68		72		73							3
B00A4M2			68		71		73	59			69			5
B00A5M2			69		72		71				70			4
B00A6M2			68		73		72				70			4
B00A7M2			68		73		72				74			4
B00A8M2			68		72		73				71			4
B00A9M2			67											1
B00B1M2			69		74									2
B00B2M2			69		71								74	3
B00B3M2			69		71									2
B00B4M2			69		73							73		3
B00B5M2			69		72									2
B00B6M2			68		72							74		3
B00BAH2			61	74			74							3
B00BBH2			62	73			74							3
B00BCH2			62	75				75						3
B00C1M2											69			1
B00C2M2											74			1
B00C3M2											68			1
B00C4M2											72			1
B00C5M2											71			1
B00C6M2											72			1
B00CAH2							73			74			75	3
B00CBH2							72	55			72			3
B00CCH2							73	53		72		75		4
B2000AR			72	59	49	44	29	11	2					7
B200AH2			68	55	71	65	45	31	27	25	19	9	8	11
B200BH2			67	56	73	67	47	34	30	28	21	12	10	11
B200CH2			67	55	73							69		4
B200DH2			68	58	74						75	65		5
B200EH2			67	58	73						73	62		5
B200FH2			67	58	70							65		4
B200GM2			67	54	72		72	57	53		70			7
B200HM2			67	56	73		73	57	53		67			7

Unit	TP													#TPs
	0	1	2	3	4	5	6	7	8	9	10	11	12	
B200IM2			67	56	72		73	59	54		71			7
B2010MX			67		73			59			66			4
B2011MX		72		63				70	66		60			5
B2012MX		72	74	59	72		50	71	65		63		70	9
B2013AR		71		61	70	59	54	61			67			7
B2014AR		71	46	56	38	57	53	61			67			8
B2020MX			68		72		73	58			69	56		6
B2021AR		71	71	57	67	63	68	38	34			73		9
B2022AR		71	45	57	40	64	57	71	73		70		66	10
B2023MX		72	47	54	41		58	65			71			7
B2024MX		72	74	49			73					65		5
B20300H											74			1
B2030AV				68					74					2
B2030DC				68			67						74	3
B2031DC				69	58		64			75	69	46	59	7
B2032DC			68	61		71	69	59	59		63	51	66	9
B2033DC			70			69	75							3
B203A0H		71												1
B203G0H							71	73	69					3
B203R0H		71												1
B203U0H							36							1
Total	0	10	38	25	34	10	33	22	13	6	34	17	12	254

Percentage of Balance On-Hand (%) for Maneuver Units
Requiring Resupply, Class III
Table L-3

For example, at the end of TP 6, B203U0H had a class III BOH of 36%. This was the only TP in which B203U0H could have asked for resupply. During TP 6, B203U0H was one of 33 units capable of requesting resupply.

(c) Problems. Table L-3 shows BOH percentage for individual maneuver units requiring resupply. However, a review of individual orders revealed a problem with the availability of replenishments and transporters (reference table L-4); problem areas have been shaded for easy identification. The "Trucks Avail" refers to the number of transporters available to convey the order; and "Avail Stocks" refers to the amount of class III at a supply unit after attempting to fill the order.

TP	REQ'ING UNIT	SUPPLY UNIT	SUPPLY TYPE	AMOUNT REQUESTED GALS	AMOUNT SHIPPED GALS	AMOUNT SHORTED (%)	TRUCKS AVAIL	AVAIL STOCKS GALS
4	B2024MX	B2024FC	POL-B	4,338.9	2,596	40.17	0	5269.4
4	B000000	B001POL	POL-B	7,579.93	2,490.64	67.14	0	3074137.3
4	B2011MX	B2011FC	POL-B	5,157.35	3,395.98	34.15	3.1	0
4	B2012MX	B2012FC	POL-B	4,612.93	2,900.22	37.13	3.1	0
5	B000000	B001POL	POL-B	7,752.97	2,494.1	67.83	0	3064780
6	B000000	B001POL	POL-B	7,502.98	2,496.67	66.72	0	3042323
6	B2021AR	B2021FC	POL-B	5,288.77	4,047.01	23.48	5.0	0
7	B2012MX	B2012FC	POL-B	4,999.34	4,250.47	14.98	3.3	0
7	B2013AR	B2013FC	POL-B	5,879.81	5,781.49	1.67	4.1	0
7	B2023MX	B2023FC	POL-B	4,626.2	4,460.94	3.57	1.0	0
8	B000000	B001POL	POL-B	7,695.22	2,497.51	67.54	0	2997298.3
9	B2021AR	B2021FC	POL-B	8,985.37	5,648.19	37.14	0	6873.6
9	B000000	B001POL	POL-B	7,665.08	2,500	67.38	0	2994664
10	B000000	B001POL	POL-B	7,423.31	2,496.3	66.37	0	2,976,721
11	B000000	B001POL	POL-B	7,312.02	2,495.47	65.87	0	2951107.7
11	B2032DC	B20DASB	POL-B	2,382.85	182.3	92.35	8.2	0
11	B2032DC	B001CSB	POL-B	2,382.85	2,200.54	7.65	0	369273.1
12	B2011MX	B2011FC	POL-B	3,410.2	2,238.33	34.36	2.5	0
12	B2012MX	B2012FC	POL-B	4,163.2	553.77	86.7	4.8	0
	TOTAL			109,159	55,726	48.9		

Problems Filling Maneuver Unit Orders, Class III
Table L-4

To quantify a measure of risk, the maximum consumption of class III by a unit for any TP is compared with the current BOH for each TP; if the value is less than one, the unit would exhaust its supplies prior to repeating the activities of this "maximum" TP. Where "at risk" is less than one TP of supply, class III was generally provided to maneuver units without placing them "at risk". Five maneuver units were "at risk". See Table L-5.

	TP													
MANEUVER UNIT	0	1	2	3	4	5	6	7	8	9	10	11	12	# of TPs
B2000AR								1	1	1	1	1	1	6
B200AH2											1	1	1	3
B200BH2											1	1	1	3
B2021AR									1					1
B203U0H							1	1	1	1	1	1	1	7

"At Risk" Units, Class III Risk
Table L-5

(d) Observation.

- 1) At least one of the maneuver units required emergency replenishment of Class III in TP 7.
- 2) 47.4 percent (9 out of 19) of the problems filling maneuver unit orders is attributed to the unavailability of Class III stockage.
- 3) 52.6 percent (10 out of 19) of the problems filling maneuver unit orders is attributed to the unavailability of Class III transporters.

(2) Supply Class V.

(a) Requirement. For the scenario, the requirement for class V (ammunition) was found by summing the consumption (quantities "used" plus quantities "lost") of all maneuver units (CSS units were excluded from this computation) during each of the 4-hour TPs. Calculated in "short tons (stons)," the requirement for class V for the length of the scenario is presented in table L-6.

TP	USED STONS	LOST STONS	REQUIREMENT CONSUMED
0	0	0	0
1	1,203	0	1,203
2	844	0	844
3	0	0	0
4	18	0	18
5	543	20	563
6	123	45	168
7	993	43	1,036
8	763	27	790
9	507	2	509
10	323	0	323
11	1,933	5	1,938
12	331	1	332
TOTAL	7,581	143	7,724

Consumption of Class V, STONS
Table L-6

(b) Discussion.

1) This analysis focuses on fourteen munition types {155MM, ATACMS, MLRS, Hellfire, Longbow, 2.75RKT, Patriot, Stinger, 120MM, 25MM, 60MM, Javelin, LAW, and TOWII} using five indices {Amount Authorized, Amount On-Hand, Amount Used, Amount Lost, and Ratio of Amount On-Hand to Amount Authorized}. A list of all corps and division assets listing VIC unit name designators and their actual unit names is contained in Appendix A. A list of all supply analysis definitions is contained in Appendix B.

a) The fourteen aforementioned munition types were grouped into seven functional categories (Field Artillery, Aviation, Air Defense Artillery, Armor & Mechanized Infantry, Light Infantry, Anti-Armor, and Anti-Tank). Each of the functional categories was divided into subcategories displayed in table L-7:

Category	Member Munition Type
Field Artillery	155MM - {M107 (CB), M116B1, M121A1, M449A1, M483A1, M549A1, M692/M731, M795, M825, M864, M864/AR, M864/GM, XM898, XM898/AR, XM898/GM, XM982, XM982/GM} ATAQMS - {ATAQMS-I, ATACMS-IA, ATACMS-II, ATACMS-IIA} MLRS - {ER-MLRS, ER-MLRS/GUIDED, M26, MSTAR}
Aviation	HELLFIRE, LONGBOW, 2.75RKT
Air Defense Artillery (ADA)	PATRIOT, STINGER
Armor & Mechanized Infantry	120MM - {120MM, PGMM, M929, M933}
Light Infantry	60MM - {M302A1, M720}
Anti-Armor	25MM - {25MM, 40MM, 45MM}
Anti-Tank	JAVELIN, LAW, TOWII

Key Functional Categories
Table L-7

b) Table L-8 displays the key munition types with the five aforementioned indices for each key munition at the end of the scenario. **The scenario end states shown are reliable indicators of individual unit supply status over the course of the scenario:**

c) Table L-8 represents an aggregation by munition type for all units in the modeled force. However, supply performance at some individual units for specific munitions varied significantly from these general indicators.

- The first column, key munition type, lists each of the munition types included for analysis in this report.

- The second column, amount authorized indicates quantities at initial state (TP 0) of the scenario.

- The total amount used of a key munition type (column three) can exceed the endstate BOH because during a particular TP a unit can receive a key munition type.

- Munitions lost due to combat activity (column four) did not cause any significant inventory imbalances resulting in availability shortfalls.

- The fifth and sixth columns, amount authorized and balance on hand (BOH) respectively, indicate quantities at endstate (TP 12) of the scenario.

- The seventh column, percentage of balance on hand of amount authorized, indicates that at endstate (TP 12) of the scenario, the quantity of munitions available for mission support was large and more than sufficient to meet requirements. **The Balance on Hand was at least one hundred percent of authorized for each munition type except (155MM, ATACMS, MLRS, and LONGBOW).**

	Initial State	Consumption		Endstate		
Key Munition Type	Amt Authorized {Rounds} @ TP0	Total Amount Used {Rounds}	Total Amount Lost {Rounds}	Amt Authorized {Rounds} @ TP12	BOH @ TP12 {Rounds}	Percentage BOH of Authorized
155MM	28,980	24,743	387	25,787	10,424	40%
ATACMS	531	389	12	425	129	30%
MLRS	16,389	12,210	104	14,148	5,280	37%
HELLFIRE	820	0	0	472	820	174%
Longbow	2,256	1,127	6	1,306	982	75%
2.75RKT	16,828	0	0	9,823	14,116	144%
Patriot	120	2	0	109	118	108%
STINGER	1,362	146	11	921	1,047	114%
120MM	11,720	127	80	10,626	11,556	109%
60MM	2,682	0	680	712	1,330	187%
25MM	323,460	906	40,771	260,825	278,192	107%
JAVELIN	408	10	10	369	391	106%
LAW	2,068	12	13	1,922	2,043	106%
TOWII	1,290	22	50	972	1,227	126%

Key Munition Status
Table L-8

d) Table L-9 provides an overall summary of the additional supply indicators which help assess the sufficiency of munition availability. Although the indicators are shown by munition type, the individual indicators represent the presence (Yes) or absence (No) of that indicator for some specific unit(s) in the force at the end of a specific TP. Tables L-10 thru L-30 provide more detailed analyses of the aforementioned munition availability criteria.

Key Munition Type	BOH(>=75%)	Standard Replenishment BOH(50%-74%)	Emergency Replenishment BOH(1%-49%)	BOH(=0)
155MM	Yes	Yes	Yes	Yes
ATACMS	Yes	Yes	Yes	Yes
MLRS	Yes	Yes	Yes	Yes
HELLFIRE	Yes	No	No	No
Longbow	Yes	Yes	Yes	No
2.75RKT	Yes	No	Yes	Yes
Patriot	Yes	No	No	No
STINGER	Yes	Yes	Yes	No
120MM	Yes	Yes	Yes	No
60MM	Yes	Yes	No	No
25MM	Yes	No	No	No
JAVELIN	Yes	No	Yes	No
LAW	Yes	No	No	Yes
TOWII	Yes	No	No	Yes

Balance on Hand Status
Table L-9

- Balance on Hand (>=75%) of Authorized: Initially all units start in this range since the amount authorized is equal to the balance on hand. BOHs which remain in this range maintain a sufficient quantity of authorized munitions and at no time throughout the scenario require supply replenishment.

- Balance on Hand (50%-74%) of Authorized: This column indicates whether or not the BOH by munition type at any unit fell to the indicated percentage range of the authorized amount. BOH in this range triggers "standard supply replenishment" requests.

-- For seven of the munition types (HELLFIRE, 2.75RKT, PATRIOT, 25MM, JAVELIN, LAW, and TOWII) no standard supply replenishment was required at any time during the scenario. No HELLFIRE, 2.75RKT, or 60MM munition type was expended during this scenario. Also, no HELLFIRE, 2.75RKT or PATRIOT munition type was lost due to attrition of systems.

-- The other eight munition types (155MM, ATACMS, MLRS, LONGBOW, STINGER, 120MM, and 60MM) triggered standard resupply orders at some specific unit. Tables L-10 through L-16 identify the unit, the time period, and the sub-munition(s) which triggered a standard resupply order.

Unit Name	BOH(50%-74%)	Time Period(TP)	Sub-munition
A BTY 3RD BN 2ND BDE X CORPS ARTY	54% 62%	TP 4 TP 4	M107(CB) M483A1
B BTY 3RD BN 2ND BDE X CORPS ARTY	54% 62%	TP 3 & 4 TP 4	M107(CB) M483A1
C BTY 3RD BN 2ND BDE X CORPS ARTY	62%	TP 4	M483A1
A BTY 4TH BN 3RD BDE X CORPS ARTY	69% 69% 60%	TP 10 TP 11 & 12 TP 11	XM982 M549A1 XM982
B BTY 4TH BN 3RD BDE X CORPS ARTY	56% 58%	TP 12 TP 12	M864 XM982
C BTY 4TH BN 3RD BDE X CORPS ARTY	74%	TP 11 & 12	M549A1
1 BN-A 155SP BTRY (HIP) EXFOR DIVARTY	74% 72% 64% 51%	TP 2 & 3 TP 5 & 6 TP 6 TP 7	M107(CB) M107(CB) M549A1 XM898
1 BN-B 155SP BTRY (HIP) EXFOR DIVARTY	51% 66% 68%	TP 2 TP 4 TP 9	M483A1 M549A1 XM898
1 BN-C 155SP BTRY (HIP) EXFOR DIVARTY	63% 75% 72%	TP 5 TP 9 TP 12	M795 M107(CB) M795
2 BN-A 155SP BTRY (HIP) EXFOR DIVARTY	73% 50% 74% 59% 75%	TP 1 TP 1 TP 1 TP 2 TP 11 & 12	M107(CB) M483A1 M795 M483A1 M795
2 BN-B 155SP BTRY (HIP) EXFOR DIVARTY	74% 66% 75%	TP 1 TP 3-6 TP 11 & 12	M795 M549A1 M795
2 BN-C 155SP BTRY (HIP) EXFOR DIVARTY	74% 71% 66% 72%	TP 1 TP 2-6 TP 3-6 TP 7	M795 M107(CB) M549A1 M107(CB)

155MM Standard Replenishment
Table L-10

Unit Name	BOH(50%-74%)	Time Period(TP)	Sub-munition
A BTY 1ST BN 2ND BDE X CORPS ARTY (MLRS)	58% 60% 59%	TP 7 TP 7 & 8 TP 8	ATACMS-I ATACMS-IA ATACMS-I
B BTY 1ST BN 2ND BDE X CORPS ARTY (MLRS)	68% 58% 59% 57% 58%	TP 5 TP 6 TP 6 TP 8 TP 8	ATACMS-II ATACMS-I ATACMS-IA ATACMS-I ATACMS-IA

Unit Name	BOH(50%-74%)	Time Period(TP)	Sub-munition
C BTY 1ST BN 2ND BDE X CORPS ARTY (MLRS)	60%	TP 6	ATACMS-I
	66%	TP 6	ATACMS-IA
	62%	TP 8	ATACMS-I
	67%	TP 8	ATACMS-IA
	54%	TP 9	ATACMS-IA
	50%	TP 10	ATACMS-I
	55%	TP 10	ATACMS-IA
	51%	TP 11	ATACMS-IA

ATACMS Standard Replenishment
Table L-11

Unit Name	BOH(50%-74%)	Time Period(TP)	Sub-munition
A BTY 1ST BN 1ST BDE X CORPS ARTY (MLRS)	69%	TP 9	M26
B BTY 1ST BN 1ST BDE X CORPS ARTY (MLRS)	59%	TP 3 & 4	ER-MLRS/GUIDE
	60%	TP 5 & 6	ER-MLRS/GUIDE
	70%	TP 10	M26
C BTY 1ST BN 1ST BDE X CORPS ARTY (MLRS)	64%	TP 1	ER-MLRS
	73%	TP 12	M26
A BTY 2ND BN 1ST BDE X CORPS ARTY (MLRS)	55%	TP 1	ER-MLRS
	54%	TP 9	ER-MLRS/GUIDE
	72%	TP 9	M26
	66%	TP 10	M26
B BTY 2ND BN 1ST BDE X CORPS ARTY (MLRS)	56%	TP 9	ER-MLRS/GUIDE
	72%	TP 10	M26
	50%	TP 9	ER-MLRS/GUIDE
	73%	TP 10	M26
C BTY 2ND BN 1ST BDE X CORPS ARTY (MLRS)	67%	TP 1	ER-MLRS/GUIDE
	68%	TP 2	ER-MLRS/GUIDE
	71%	TP 7	ER-MLRS/GUIDE
	69%	TP 11	M26
	59%	TP 12	M26
B BTY 3RD BN 1ST BDE X CORPS ARTY (MLRS)	73%	TP 1	ER-MLRS
	70%	TP 8	ER-MLRS/GUIDE
C BTY 3RD BN 1ST BDE X CORPS ARTY (MLRS)	67%	TP 1	ER-MLRS/GUIDE
	68%	TP 2	ER-MLRS/GUIDE
A BTY 1ST BN 2ND BDE X CORPS ARTY (MLRS)	66%	TP 6	ER-MLRS
	67%	TP 6	ER-MLRS/GUIDE
	52%	TP 7	M26
	53%	TP 8	M26
B BTY 1ST BN 2ND BDE X CORPS ARTY	59%	TP 3,4,5	M26
	61%	TP 7	ER-MLRS
	62%	TP 7	ER-MLRS/GUIDE
C BTY 1ST BN 2ND BDE X CORPS ARTY	72%	TP 7	ER-MLRS/GUIDE
	72%	TP 7	ER-MLRS
C BTY 2ND BN 2ND BDE X CORPS ARTY	68%	TP 1 & 2	ER-MLRS/GUIDE
A BTY 1ST BN 3RD BDE X CORPS ARTY	74%	TP 9	M26
4 BN-A MLRS BTRY EXFOR DIVARTY	62%	TP 7	MSTAR
	63%	TP 8	MSTAR
	64%	TP 9 & 10	MSTAR
	66%	TP 11	MSTAR
	65%	TP 12	MSTAR
4 BN-B MLRS BTRY EXFOR DIVARTY	63%	TP 7-10	MSTAR
	64%	TP 11 & 12	MSTAR
4 BN-C MLRS BTRY EXFOR DIVARTY	63%	TP 7	MSTAR
	65%	TP 8	MSTAR
	72%	TP 9	MSTAR
	73%	TP 10	MSTAR
	71%	TP 11	MSTAR
	70%	TP 12	MSTAR

MLRS Standard Replenishment
Table L-12

Unit Name	BOH(50%-74%)	Time Period(TP)	Sub-munition
1 BN 1 ATK BDE X CORPS AVN	64%	TP 6	Longbow
2 BN 1 ATK BDE X CORPS AVN	54%	TP 6	Longbow
ATTACK BN	58%	TP 1	Longbow
	69%	TP 8	Longbow
	68%	TP 11	Longbow
CAV SQD GRD/AIR RECON	69%	TP 1	Longbow
	52%	TP 2	Longbow
	64%	TP 9	Longbow
	72%	TP 10	Longbow
	74%	TP 12	Longbow
DIVISION AIR RECON	58%	TP 1	Longbow

Longbow Standard Replenishment
Table-13

Unit Name	BOH(50%-74%)	Time Period(TP)	Sub-munition
Avenger PLT 10th CORPS	74%	TP 10	Stinger
	71%	TP 11 & 12	Stinger
Avenger PLT Infantry BN HQ	60%	TP 7 & 8	Stinger
	59%	TP 9	Stinger
	57%	TP 10	Stinger
BSFV PLT 2 BDE EXFOR (AR)	70%	TP 7 & 9	Stinger
	71%	TP 8	Stinger
Avenger PLT Divarty EXFOR	74%	TP 11 & 12	Stinger
Avenger PLT 1 BDE EXFOR (MX)	66%	TP 10	Stinger

Stinger Standard Replenishment
Table-14

Unit Name	BOH(50%-74%)	Time Period(TP)	Sub-munition
A Trp DIVISION CAV SQDRN	62%	TP 4	PGMM

120MM Standard Replenishment
Table L-15

Unit Name	BOH(50%-74%)	Time Period(TP)	Sub-munition
B2030IN: Infantry BN HQ	53%	TP 0	M720
	67%	TP 1	M720
	68%	TP 2-6	M720

60MM Standard Replenishment
Table L-16

- Balance on Hand (1%-49%) of Authorized: This column indicates whether or not the BOH by munition type at any unit fell to the indicated percentage range of the authorized amount. BOH in this range triggers "emergency supply replenishment" requests. Eight of the munition types (155MM, ATACMS, MLRS, Longbow, 2.75RKT, Stinger, 120MM and Javelin) required emergency resupply. Tables L-17 through L-24 depict specific unit, time period, and sub-munition type which generate an emergency resupply request.

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
A BTY 3RD BN 2ND BDE X CORPS ARTY	8%	TP 1	M864
	33%	TP 2-7,12	M864
	36%	TP 2 & 3	M483A1
	25%	TP 3 & 4	XM982
	34%	TP 8-11	M864
B BTY 3RD BN 2ND BDE X CORPS ARTY	8%	TP 1	M864
	33%	TP 2-8,12	M864
	36%	TP 2 & 3	M483A1
	25%	TP 3 & 4	XM982
	34%	TP 9-11	M864

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
C BTY 3RD BN 2ND BDE X CORPS ARTY	8%	TP 1 & 2	M864
	36%	TP 2 & 3	M483A1
	25%	TP 3 & 4	XM982
	36%	TP 3	M107 (CB)
	33%	TP 3,5,6	M864
	34%	TP 4,7-12	M864
A BTY 4TH BN 3RD BDE X CORPS ARTY	42%	TP 7	M107 (CB)
	31%	TP 7	M549A1
	31%	TP 7	M864
	34%	TP 7	XM982
	13%	TP 8 & 9	M549A1
	19%	TP 8	M864
	16%	TP 8	XM898
	22%	TP 8	XM982
	3%	TP 9 & 10	M864
	10%	TP 9	XM898
	12%	TP 10	M549A1
	4%	TP 10 & 11	XM898
	13%	TP 11	M864
B BTY 4TH BN 3RD BDE X CORPS ARTY	39%	TP 7	M107 (CB)
	27%	TP 7	M483A1
	30%	TP 7	M549A1
	34%	TP 7	M864
	32%	TP 7	XM982
	8%	TP 8	M483A1
	12%	TP 8	M549A1
	22%	TP 8	M864
	8%	TP 8	XM898
	26%	TP 8	XM982
	7%	TP 9	M483A1
	10%	TP 9	M549A1
	7%	TP 9,10,11	XM898
	27%	TP 10	M483A1
	11%	TP 10	M549A1
	3%	TP 11	M483A1
	4%	TP 12	M483A1
	6%	TP 12	XM898
C BTY 4TH BN 3RD BDE X CORPS ARTY	25%	TP 7	M107 (CB)
	34%	TP 7	M483A1
	25%	TP 7	M549A1
	25%	TP 7	M864
	31%	TP 7	XM982
	12%	TP 8	M483A1
	32%	TP 8	M549A1
	18%	TP 8	M864
	28%	TP 8	XM982
	2%	TP 9 & 10	M483A1
	10%	TP 9 & 10	M549A1
	1%	TP 9	M864
	16%	TP 9	XM982
	2%	TP 10	M864
	17%	TP 10	XM898
	6%	TP 10	XM982
	5%	TP 11 & 12	M483A1
	11%	TP 11 & 12	M864
	4%	TP 11	XM898
	23%	TP 11	XM982
	3%	TP 12	XM982
1 BN-A 155SP BTRY EXFOR DIVARTY	1%	TP 2 & 3	XM982
	27%	TP 4	XM982
	25%	TP 6	M864
	8%	TP 8	M483A1
	39%	TP 8	XM898
	2%	TP 9,10,11	M483A1
	2%	TP 9 & 10	XM898
	18%	TP 11	XM898
	5%	TP 12	XM898

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
1 BN-B 155SP BTRY EXFOR DIVARTY	25%	TP 2 & 3	XM982
	26%	TP 4	XM982
	29%	TP 10	XM898
	1%	TP 11 & 12	XM898
	25%	TP 12	M483A1
1 BN-C 155SP BTRY EXFOR DIVARTY	30%	TP 1	M864
	41%	TP 1	XM982
	42%	TP 2,3,4	M549A1
	27%	TP 2,3,4	XM982
	6%	TP 5-9	M549A1
2 BN-A 155SP BTRY EXFOR DIVARTY	25%	TP 6,7,8	M483A1
	42%	TP 2 & 3	M107 (CB)
	45%	TP 2-6	M549A1
	1%	TP 2	XM982
	40%	TP 3,5,6	XM982
	43%	TP 4	M107 (CB)
	41%	TP 4	XM982
	11%	TP 8	M483A1
	5%	TP 9	M483A1
	44%	TP 11	XM898
2 BN-B 155SP BTRY EXFOR DIVARTY	29%	TP 12	XM898
	25%	TP 2 & 3	M107 (CB)
	46%	TP 2	M549A1
	8%	TP 2	XM982
	33%	TP 3,5,6	XM982
	26%	TP 4	M107 (CB)
	34%	TP 4	XM982
	12%	TP 8	M483A1
	6%	TP 9	M483A1
2 BN-C 155SP BTRY EXFOR DIVARTY	45%	TP 1	M107 (CB)
	34%	TP 7	XM982
	12%	TP 8	M483A1
	22%	TP 8	XM982
	5%	TP 9,10,11	M483A1
	11%	TP 9	M483A1
	32%	TP 10	XM982
	17%	TP 11	XM982
	6%	TP 12	XM982

155MM Emergency Replenishment
Table L-17

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
A BTY 3RD BN 1ST BDE X CORPS ARTY	34%	TP 1-7	ATACMS-I
	11%	TP 5,6,7	ATACMS-II
	11%	TP 5,6,7	ATACMS-IIA
	42%	TP 6 & 7	ATACMS-IA
	38%	TP 8 & 10	ATACMS-I
	47%	TP 8 & 10	ATACMS-IA
	13%	TP 8-12	ATACMS-II
	13%	TP 8-12	ATACMS-IIA
	37%	TP 9,11,12	ATACMS-I
	46%	TP 9 & 11	ATACMS-IA
	45%	TP 12	ATACMS-IA
B BTY 3RD BN 1ST BDE X CORPS ARTY	34%	TP 1-8	ATACMS-I
	11%	TP 5-8	ATACMS-II
	42%	TP 6	ATACMS-IA
	43%	TP 7-12	ATACMS-IA
	35%	TP 9-12	ATACMS-I
	12%	TP 9-12	ATACMS-II

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
C BTY 3RD BN 1ST BDE X CORPS ARTY	34%	TP 1-4	ATACMS-I
	45%	TP 5	ATACMS-I
	15%	TP 5	ATACMS-II
	11%	TP 5	ATACMS-IIA
	39%	TP 6,7,8	ATACMS-I
	45%	TP 6 & 8	ATACMS-IA
	13%	TP 6,7,8,10	ATACMS-II
	9%	TP 6 & 7	ATACMS-IIA
	46%	TP 7	ATACMS-IA
	8%	TP 8-12	ATACMS-IIA
	38%	TP 9 & 10	ATACMS-I
	44%	TP 9 & 10	ATACMS-IA
	12%	TP 9,11,12	ATACMS-II
	37%	TP 11	ATACMS-I
	43%	TP 11	ATACMS-IA
	36%	TP 12	ATACMS-I
	12%	TP 12	ATACMS-II
A BTY 1ST BN 2ND BDE X CORPS ARTY	34%	TP 1-5	ATACMS-I
	11%	TP 5	ATACMS-II
	29%	TP 6	ATACMS-II
	20%	TP 7	ATACMS-II
	48%	TP 9	ATACMS-I
	50%	TP 9	ATACMS-IA
	16%	TP 9	ATACMS-II
	45%	TP 10 & 11	ATACMS-I
	46%	TP 10 & 11	ATACMS-IA
	15%	TP 10 & 11	ATACMS-II
	43%	TP 12	ATACMS-I
	44%	TP 12	ATACMS-IA
	14%	TP 12	ATACMS-II
B BTY 1ST BN 2ND BDE X CORPS ARTY	34%	TP 1-5	ATACMS-I
	19%	TP 6	ATACMS-II
	27%	TP 7	ATACMS-II
	18%	TP 8	ATACMS-II
	47%	TP 9	ATACMS-I
	48%	TP 9 & 10	ATACMS-IA
	15%	TP 9	ATACMS-II
	48%	TP 10	ATACMS-I
	16%	TP 10	ATACMS-II
	45%	TP 11	ATACMS-I
	45%	TP 11	ATACMS-IA
	15%	TP 11	ATACMS-II
	42%	TP 12	ATACMS-I
	43%	TP 12	ATACMS-IA
	14%	TP 12	ATACMS-II
C BTY 1ST BN 2ND BDE X CORPS ARTY	34%	TP 1-5	ATACMS-I
	45%	TP 5	ATACMS-II
	20%	TP 6 & 8	ATACMS-II
	32%	TP 7	ATACMS-II
	50%	TP 9	ATACMS-I
	16%	TP 9	ATACMS-II
	17%	TP 10	ATACMS-II
	46%	TP 11	ATACMS-I
	15%	TP 11	ATACMS-II
	43%	TP 12	ATACMS-I
	47%	TP 12	ATACMS-IA
	14%	TP 12	ATACMS-II
A BTY 1ST BN 3RD BDE X CORPS ARTY	11%	TP 5,6,7	ATACMS-II
	34%	TP 6 & 7	ATACMS-I
	36%	TP 8,10,11,12	ATACMS-I
	12%	TP 8-12	ATACMS-I
	35%	TP 9	ATACMS-II

ATACMS Emergency Replenishment
Table L-18

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
A BTY 1ST BN 1ST BDE X CORPS ARTY	25% 45% 40% 25% 19% 30% 46% 34%	TP 3 TP 7 TP 8 TP 9 TP 10 TP 10 TP 11 TP 11	ER-MLRS ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide M26 ER-MLRS/Guide ER-MLRS/Guide
B BTY 1ST BN 1ST BDE X CORPS ARTY	34% 25% 7% 1% 46% 45%	TP 1 & 2 TP 3 TP 4,5,6 TP 8,10,11,12 TP 11 TP 12	ER-MLRS/Guide ER-MLRS ER-MLRS ER-MLRS/Guide M26 M26
C BTY 1ST BN 1ST BDE X CORPS ARTY	25% 43% 33% 26% 48% 46%	TP 3-6 TP 7 & 8 TP 9 TP 10 TP 11 TP 12	ER-MLRS ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide
A BTY 2ND BN 1ST BDE X CORPS ARTY	25% 26% 42% 36% 49% 40% 6% 13%	TP 3,4,6 TP 5 TP 7 TP 8 TP 9 TP 11 & 12 TP 11 TP 12	ER-MLRS ER-MLRS ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide M26 M26
B BTY 2ND BN 1ST BDE X CORPS ARTY	25% 49% 38% 35% 5% 42%	TP 3-6 TP 7 TP 8 TP 11 TP 11 TP 12	ER-MLRS ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide M26 ER-MLRS/Guide
C BTY 2ND BN 1ST BDE X CORPS ARTY	18% 25% 41% 19% 13% 4%	TP 1 TP 3-6 TP 8 TP 9 TP 10 TP 11 & 12	ER-MLRS ER-MLRS ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide
A BTY 3RD BN 1ST BDE X CORPS ARTY	25% 28% 21% 11%	TP 3-6 TP 9 TP 10 TP 11 & 12	ER-MLRS ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide
B BTY 3RD BN 1ST BDE X CORPS ARTY	25% 8% 26% 21% 12% 44%	TP 3-6 TP 7 TP 9 TP 10 TP 11 TP 12	ER-MLRS ER-MLRS ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide ER-MLRS/Guide
C BTY 3RD BN 1ST BDE X CORPS ARTY	36% 25% 34% 29% 16% 9% 42%	TP 1 TP 3 & 4 TP 5 TP 6 & 7 TP 9 TP 10 TP 12	ER-MLRS ER-MLRS ER-MLRS ER-MLRS ER-MLRS/Guide ER-MLRS/Guide M26

Unit Name	BOH(14-49%)	Time Period(TP)	Sub-munition
A BTY 1ST BN 2ND BDE X CORPS ARTY	25%	TP 3,4,5	ER-MLRS
	25%	TP 3,4,5	ER-MLRS/Guide
	28%	TP 3,4,5	M26
	44%	TP 7 & 8	ER-MLRS
	44%	TP 7 & 8	ER-MLRS/Guide
	36%	TP 9	ER-MLRS
	36%	TP 9	ER-MLRS/Guide
	43%	TP 9	M26
	34%	TP 10 & 11	ER-MLRS
	34%	TP 10 & 11	ER-MLRS/Guide
	40%	TP 10	M26
	41%	TP 11	M26
	32%	TP 12	ER-MLRS
	32%	TP 12	ER-MLRS/Guide
	38%	TP 12	M26
B BTY 1ST BN 2ND BDE X CORPS ARTY	25%	TP 2-5	ER-MLRS
	25%	TP 2-5	ER-MLRS/Guide
	34%	TP 2	M26
	43%	TP 6 & 8	ER-MLRS
	43%	TP 6 & 8	ER-MLRS/Guide
	35%	TP 9	ER-MLRS
	36%	TP 9 & 10	ER-MLRS/Guide
	36%	TP 10	ER-MLRS
	33%	TP 11	ER-MLRS
	34%	TP 11	ER-MLRS/Guide
	32%	TP 12	ER-MLRS
	32%	TP 12	ER-MLRS/Guide
C BTY 1ST BN 2ND BDE X CORPS ARTY	25%	TP 2-5	ER-MLRS
	25%	TP 2-5	ER-MLRS/Guide
	45%	TP 6	ER-MLRS
	45%	TP 6 & 8	ER-MLRS/Guide
	46%	TP 8	ER-MLRS
	37%	TP 9 & 10	ER-MLRS
	37%	TP 9 & 10	ER-MLRS/Guide
	34%	TP 11	ER-MLRS
	34%	TP 11	ER-MLRS/Guide
	32%	TP 12	ER-MLRS
	32%	TP 12	ER-MLRS/Guide
A BTY 2ND BN 2ND BDE X CORPS ARTY	25%	TP 3,4,5	ER-MLRS
	27%	TP 6-12	ER-MLRS/Guide
B BTY 2ND BN 2ND BDE X CORPS ARTY	3%	TP 1	ER-MLRS
	25%	TP 3-7	ER-MLRS
	26%	TP 8-12	ER-MLRS
C BTY 2ND BN 2ND BDE X CORPS ARTY	25%	TP 3,4,5	ER-MLRS
	27%	TP 6	ER-MLRS
	31%	TP 7	ER-MLRS
	29%	TP 8	ER-MLRS
	28%	TP 9-12	ER-MLRS
A BTY 1ST BN 3RD BDE X CORPS ARTY	43%	TP 7	ER-MLRS/Guide
	41%	TP 8	ER-MLRS/Guide
	27%	TP 9	ER-MLRS/Guide
	22%	TP 10	ER-MLRS/Guide
	45%	TP 11 & 12	ER-MLRS/Guide
B BTY 1ST BN 3RD BDE X CORPS ARTY	35%	TP 9	ER-MLRS/Guide
	21%	TP 10	ER-MLRS/Guide
	17%	TP 11 & 12	ER-MLRS/Guide
C BTY 1ST BN 3RD BDE X CORPS ARTY	26%	TP 9	ER-MLRS/Guide
	21%	TP 10	ER-MLRS/Guide
	19%	TP 11 & 12	ER-MLRS/Guide
A BTY 2ND BN 3RD BDE X CORPS ARTY	28%	TP 9 & 10	ER-MLRS/Guide
	17%	TP 11 & 12	ER-MLRS/Guide
B BTY 2ND BN 3RD BDE X CORPS ARTY	44%	TP 7	ER-MLRS/Guide
	34%	TP 8	ER-MLRS/Guide
	25%	TP 9	ER-MLRS
	27%	TP 9	ER-MLRS/Guide
	28%	TP 10	ER-MLRS/Guide
	37%	TP 11 & 12	ER-MLRS/Guide

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
C BTY 2ND BN 3RD BDE X CORPS ARTY	27%	TP 9	ER-MLRS/Guide
	28%	TP 10	ER-MLRS/Guide
	18%	TP 11 & 12	ER-MLRS/Guide
4 BN-A MLRS BTY EXFOR DIVARTY	41%	TP 7	ER-MLRS/Guide
	35%	TP 8	ER-MLRS/Guide
	20%	TP 8	M26
	27%	TP 9 & 10	ER-MLRS/Guide
	11%	TP 11	ER-MLRS/Guide
	38%	TP 12	ER-MLRS/Guide
4 BN-B MLRS BTY EXFOR DIVARTY	42%	TP 7	ER-MLRS/Guide
	35%	TP 8	ER-MLRS/Guide
	28%	TP 9 & 10	ER-MLRS/Guide
	11%	TP 11	ER-MLRS/Guide
	37%	TP 12	ER-MLRS/Guide
4 BN-C MLRS BTY EXFOR DIVARTY	45%	TP 7	ER-MLRS/Guide
	34%	TP 8	ER-MLRS/Guide
	38%	TP 9	ER-MLRS/Guide
	39%	TP 10	ER-MLRS/Guide
	19%	TP 11	ER-MLRS/Guide
	50%	TP 11	M26
	18%	TP 12	ER-MLRS/Guide
	5%	TP 12	M26

MLRS Emergency Replenishment
Table L-19

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
1 BN 1 ATK BDE X CORPS AVN	33%	TP 7	Longbow
	10%	TP 8	Longbow
2 BN 1 ATK BDE X CORPS AVN	27%	TP 7	Longbow
	46%	TP 8	Longbow
	1%	TP 9	Longbow
	15%	TP 10 & 11	Longbow
	13%	TP 12	Longbow

Longbow Emergency Replenishment
Table L-20

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
DIVISION AIR RECON	42%	TP 8	2.75RKT
	39%	TP 9	2.75RKT
	37%	TP 10	2.75RKT
	43%	TP 11	2.75RKT
	41%	TP 12	2.75RKT

2.75RKT Emergency Replenishment
Table L-21

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
AVENGER PLT 1 BDE EXFOR (MX)	37%	TP 11 & 12	STINGER

STINGER Emergency Replenishment
Table L-22

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
B TRP CAV SQDRN	23%	TP 2	PGMM

120MM Emergency Replenishment
Table L-23

Unit Name	BOH(1%-49%)	Time Period(TP)	Sub-munition
B AIR ASLT PLT A CO INFANTRY BN	47%	TP 7-12	JAVELIN
C AIR ASLT PLT A CO INFANTRY BN	38%	TP 7-12	JAVELIN

JAVELIN Emergency Replenishment
Table L-24

- Zero Balance on Hand: This column indicates whether or not the BOH by munition type at any unit fell to zero. Six of the munition types (155MM, ATACMS, MLRS, 2.75RKT, LAW and TOWII) experience a zero balance on hand. Tables L-25 through L-30 depict specific unit, time period, and sub-munition type which experience a zero balance on hand.

Unit Name	BOH(=0)	Time Period(TP)	Sub-munition
A BTY 3RD BN 2ND BDE X CORPS ARTY	0%	TP 1	M549A1
	0%	TP 1,2,5-12	XM982
	0%	TP 2,3,5-12	M107(CB)
	0%	TP 5-12	M483A1
B BTY 3RD BN 2ND BDE X CORPS ARTY	0%	TP 1	M549A1
	0%	TP 1,2,5-12	XM982
	0%	TP 2,5-12	M107(CB)
	0%	TP 5-12	M483A1
C BTY 3RD BN 2ND BDE X CORPS ARTY	0%	TP 1	M549A1
	0%	TP 1,2,5-12	XM982
	0%	TP 2,3,5-12	M107(CB)
	0%	TP 5-12	M483A1
A BTY 4TH BN 3RD BDE X CORPS ARTY	0%	TP 5-12	M483A1
	0%	TP 5,6,8-12	M107(CB)
	0%	TP 12	M864
B BTY 4TH BN 3RD BDE X CORPS ARTY	0%	TP 5,6,8-12	M107(CB)
C BTY 4TH BN 3RD BDE X CORPS ARTY	0%	TP 5,6,8-12	M107(CB)
	0%	TP 12	XM898
1 BN-A 155SP BTRY EXFOR DIVARTY	0%	TP 5-12	XM982
	0%	TP 5,7-12	M864
	0%	TP 5,7-12	M549A1
	0%	TP 9-12	M107(CB)
	0%	TP 12	M483A1
1 BN-B 155SP BTRY EXFOR DIVARTY	0%	TP 1-12	M864
	0%	TP 1,2,3,5-12	M549A1
	0%	TP 1,5-12	XM982
	0%	TP 9,10,11	M483A1
	0%	TP 10,11,12	M107(CB)
1 BN-C 155SP BTRY EXFOR DIVARTY	0%	TP 1,10,11,12	M549A1
	0%	TP 2-12	M864
	0%	TP 5-12	XM982
	0%	TP 5,9-12	M549A1
	0%	TP 10,11,12	M107(CB)
2 BN-A 155SP BTRY EXFOR DIVARTY	0%	TP 1-12	M864
	0%	TP 1,7-12	M549A1
	0%	TP 5-12	M107(CB)
	0%	TP 7-12	XM982
	0%	TP 10,11,12	M483A1
2 BN-B 155SP BTRY EXFOR DIVARTY	0%	TP 1-12	M864
	0%	TP 1,6-12	M107(CB)
	0%	TP 1,7-12	M549A1
	0%	TP 7-12	XM982
	0%	TP 10,11,12	M483A1
2 BN-C 155SP BTRY EXFOR DIVARTY	0%	TP 1-12	M864
	0%	TP 1,2,7-12	M549A1
	0%	TP 8-12	M107(CB)
	0%	TP 12	M483A1

155MM Zero Balance
Table L-25

Unit Name	BOH(=0)	Time Period(TP)	Sub-munition
B BTY 3RD BN 1ST BDE X CORPS ARTY	0%	TP 5-12	ATACMS-IIA
A BTY 1ST BN 2ND BDE X CORPS ARTY	0%	TP 5-12	ATACMS-IIA
B BTY 1ST BN 2ND BDE X CORPS ARTY	0%	TP 5-12	ATACMS-IIA
C BTY 1ST BN 2ND BDE X CORPS ARTY	0%	TP 5-12	ATACMS-IIA

ATACMS Zero Balance
Table L-26

Unit Name	BOH(=0)	Time Period(TP)	Sub-munition
A BTY 1ST BN 1ST BDE X CORPS ARTY	0% 0%	TP 1-12 TP 11 & 12	ER-MLRS M26
B BTY 1ST BN 1ST BDE X CORPS ARTY	0% 0%	TP 1,2,7-12 TP 9	ER-MLRS ER-MLRS/Guide
C BTY 1ST BN 1ST BDE X CORPS ARTY	0%	TP 2,7-12	ER-MLRS
A BTY 2ND BN 1ST BDE X CORPS ARTY	0%	TP 7-12	ER-MLRS
B BTY 2ND BN 1ST BDE X CORPS ARTY	0% 0%	TP 2,7-12 TP 12	ER-MLRS M26
C BTY 2ND BN 1ST BDE X CORPS ARTY	0%	TP 7-12	ER-MLRS
A BTY 3RD BN 1ST BDE X CORPS ARTY	0%	TP 2,7-12	ER-MLRS
B BTY 3RD BN 1ST BDE X CORPS ARTY	0%	TP 8-12	ER-MLRS
C BTY 3RD BN 1ST BDE X CORPS ARTY	0% 0%	TP 8-12 TP 11 & 12	ER-MLRS ER-MLRS/Guide
A BTY 1ST BN 2ND BDE X CORPS ARTY	0% 0% 0%	TP 1 & 2 TP 1 & 2 TP 2	ER-MLRS ER-MLRS/Guide M26
B BTY 1ST BN 2ND BDE X CORPS ARTY	0% 0%	TP 1 TP 1	ER-MLRS ER-MLRS/Guide
C BTY 1ST BN 2ND BDE X CORPS ARTY	0% 0%	TP 1 TP 1	ER-MLRS ER-MLRS/Guide
A BTY 2ND BN 2ND BDE X CORPS ARTY	0%	TP 2	ER-MLRS
B BTY 2ND BN 2ND BDE X CORPS ARTY	0%	TP 2	ER-MLRS
C BTY 2ND BN 2ND BDE X CORPS ARTY	0%	TP 1 & 2	ER-MLRS
A BTY 1ST BN 3RD BDE X CORPS ARTY	0% 0%	TP 7-12 TP 11 & 12	ER-MLRS M26
B BTY 1ST BN 3RD BDE X CORPS ARTY	0% 0%	TP 7-12 TP 11 & 12	ER-MLRS M26
C BTY 1ST BN 3RD BDE X CORPS ARTY	0% 0%	TP 7-12 TP 11 & 12	ER-MLRS M26
A BTY 2ND BN 3RD BDE X CORPS ARTY	0% 0%	TP 7-12 TP 11 & 12	ER-MLRS M26
B BTY 2ND BN 3RD BDE X CORPS ARTY	0% 0%	TP 7,8,10,11,12 TP 11 & 12	ER-MLRS M26
C BTY 2ND BN 3RD BDE X CORPS ARTY	0% 0%	TP 7-12 TP 11 & 12	ER-MLRS M26
4 BN-A MLRS BTY EXFOR DIVARTY	0% 0%	TP 7-12 TP 9-12	ER-MLRS M26
4 BN-B MLRS BTY EXFOR DIVARTY	0% 0%	TP 7-12 TP 8-12	ER-MLRS M26
4 BN-C MLRS BTY EXFOR DIVARTY	0%	TP 7-12	ER-MLRS

MLRS Zero Balance
Table L-27

Unit Name	BOH(=0)	Time Period(TP)	Sub-munition
CAV SQD GRD/AIR RECON	0%	TP 8-12	2.75RKT

2.75RKT Zero Balance
Table L-28

Unit Name	BOH(=0)	Time Period(TP)	Sub-munition
A AIR ASLT PLT A CO INFANTRY BN	0%	TP 7-12	LAW
C AIR ASLT PLT B CO INFANTRY BN	0%	TP 7-12	LAW

LAW Zero Balance
Table L-29

Unit Name	BOH(=0)	Time Period(TP)	Sub-munition
INFANTRY BN HQ	0%	TP 7 & 8	TOWII

TOWII Zero Balance
Table L-30

(c) Problems. Of the 2064.9 stons ordered, via standard resupply, 2063.1 stons were shipped (approximately 99.91 percent). Problems in unfilled orders are associated with unavailable transporters or replenishments (reference table L-31).

TP	REQUESTING UNIT	SUPPLY UNIT	SUPPLY TYPE	AMOUNT REQUESTED (Rounds)	AMOUNT SHIPPED (Rounds)	AMOUNT SHORTED (%)	TRUCKS AVAIL	AVAIL STOCKS (Rounds)
1	B2030IN	B2030FC	M720	970	300	69.1	2.9	0
	TOTAL			970	300	69.1		0

Problems Filling Maneuver Unit Orders, Class V
Table L-31

- The problems of unfilled orders have rippled into maneuver units. In the table below, supply type-maneuver unit combinations that have a zero BOH are presented. The table has been coded: 0 - time and distance problems; 1 - unsupported materiel; 2 - insufficient replenishment stockages; and 3 - unavailable transporters. Generally, once a unit experienced a zero BOH, the zero BOH continued to the end of the scenario.

- From table L-32 below, zero BOH are attributed to shortages of transporters, shortages of replenishments, and large time-distances between maneuver units and their supporting CSS unit. The reader is cautioned regarding the "0"; some maneuver units consume everything on-hand, and cannot be provided a supply type fast enough regardless of the speed of the CSS system.

SUPPLY TYPE	MANEUVER UNIT	TP													
		0	1	2	3	4	5	6	7	8	9	10	11	12	# TPs
2.75RKT	B203G0H									0	0	0	0	0	5
ATACMS-IIA	B00A8M2						1	1	1	1	1	1	1	1	8
ATACMS-IIA	B00B1M2						1	1	1	1	1	1	1	1	8
ATACMS-IIA	B00B2M2						1	1	1	1	1	1	1	1	8
ATACMS-IIA	B00B3M2						1	1	1	1	1	1	1	1	8
ER-MLRS	B00A1M2		0	0		0	0	0	0	0	0	0	0	0	11
ER-MLRS	B00A2M2		0	0					0	0	0	0	0	0	8
ER-MLRS	B00A3M2			0					0	0	0	0	0	0	7
ER-MLRS	B00A4M2								0	0	0	0	0	0	6
ER-MLRS	B00A5M2			0					0	0	0	0	0	0	7
ER-MLRS	B00A6M2								0	0	0	0	0	0	6
ER-MLRS	B00A7M2			0					0	0	0	0	0	0	7
ER-MLRS	B00A8M2									0	0	0	0	0	5
ER-MLRS	B00A9M2									0	0	0	0	0	5
ER-MLRS	B00B1M2		0	0											2

SUPPLY TYPE	MANEUVER UNIT	TP													# TPs
		0	1	2	3	4	5	6	7	8	9	10	11	12	
ER-MLRS	B00B2M2		0												1
ER-MLRS	B00B3M2		0												1
ER-MLRS	B00B4M2			0											1
ER-MLRS	B00B5M2			0											1
ER-MLRS	B00B6M2		0	0											2
ER-MLRS	B00C1M2								0	0	0	0	0	0	6
ER-MLRS	B00C2M2								0	0	0	0	0	0	6
ER-MLRS	B00C3M2								0	0	0	0	0	0	6
ER-MLRS	B00C4M2									0	0	0	0	0	5
ER-MLRS	B00C5M2								0	0		0	0	0	5
ER-MLRS	B00C6M2								0	0	0	0	0	0	6
ER-MLRS	B200GM2								0	0	0	0	0	0	6
ER-MLRS	B200HM2								0	0	0	0	0	0	6
ER-MLRS	B200IM2								0	0	0	0	0	0	6
ER-MLRS	B00A2M2										0				1
ER-MLRS	B00B1M2		0	0											2
ER-MLRS	B00B2M2		0												1
ER-MLRS	B00B3M2		0												1
LAW	B2031IN								0	0	0	0	0	0	6
LAW	B2036IN								0	0	0	0	0	0	6
M107 (CB)	B00BAH2			0	0		0	0	0	0	0	0	0	0	10
M107 (CB)	B00BBH2			0			0	0	0	0	0	0	0	0	9
M107 (CB)	B00BCH2			0	0		0	0	0	0	0	0	0	0	10
M107 (CB)	B00CAH2						0	0		0	0	0	0	0	7
M107 (CB)	B00CBH2						0	0		0	0	0	0	0	7
M107 (CB)	B00CCH2						0	0		0	0	0	0	0	7
M107 (CB)	B200AH2										0	0	0	0	4
M107 (CB)	B200BH2											0	0	0	3
M107 (CB)	B200CH2											0	0	0	3
M107 (CB)	B200DH2						0	0	0	0	0	0	0	0	8
M107 (CB)	B200EH2		0					0	0	0	0	0	0	0	8
M107 (CB)	B200FH2									0	0	0	0	0	5
M26	B00A1M2												0	0	2
M26	B00A5M2													0	1
M26	B00B1M2			0											1
M26	B00C1M2												0	0	2
M26	B00C2M2												0	0	2
M26	B00C3M2												0	0	2
M26	B00C4M2												0	0	2
M26	B00C5M2												0	0	2
M26	B00C6M2												0	0	2

SUPPLY TYPE	MANEUVER UNIT	TP														# TPs
		0	1	2	3	4	5	6	7	8	9	10	11	12		
M26	B200GM2										0	0	0	0	4	
M26	B200HM2									0	0	0	0	0	5	
M483A1	B00BAH2						0	0	0	0	0	0	0	0	8	
M483A1	B00BBH2						0	0	0	0	0	0	0	0	8	
M483A1	B00BCH2						0	0	0	0	0	0	0	0	8	
M483A1	B00CAH2						0	0	0	0	0	0	0	0	8	
M483A1	B200AH2													0	1	
M483A1	B200BH2										0	0	0		3	
M483A1	B200CH2						0				0	0	0	0	5	
M483A1	B200DH2											0	0	0	3	
M483A1	B200EH2											0	0	0	3	
M483A1	B200FH2													0	1	
M549A1	B00BAH2		0												1	
M549A1	B00BBH2		0												1	
M549A1	B00BCH2		0												1	
M549A1	B200AH2						0		0	0	0	0	0	0	7	
M549A1	B200BH2		0	0	0		0	0	0	0	0	0	0	0	11	
M549A1	B200CH2		0									1	1	1	4	
M549A1	B200DH2		0						0	0	0	0	0	0	7	
M549A1	B200EH2		0						0	0	0	0	0	0	7	
M549A1	B200FH2		0	0					0	0	0	0	0	0	8	
M864	B00CAH2													0	1	
M864	B200AH2						0		0	0	0	0	0	0	7	
M864	B200BH2		0	0	0	0	0	0	0	0	0	0	0	0	12	
M864	B200CH2			0	0	0	0	0	0	0	0	0	0	0	11	
M864	B200DH2		0	0	0	0	0	0	0	0	0	0	0	0	12	
M864	B200EH2		0	0	0	0	0	0	0	0	0	0	0	0	12	
M864	B200FH2		0	0	0	0	0	0	0	0	0	0	0	0	12	
TOWII	B2030IN								0	0					2	
XM898	B00CCH2													0	1	
XM982	B00BAH2		0	0			0	0	0	0	0	0	0	0	10	
XM982	B00BBH2		0	0			0	0	0	0	0	0	0	0	10	
XM982	B00BCH2		0	0			0	0	0	0	0	0	0	0	10	
XM982	B200AH2						0	0	0	0	0	0	0	0	8	
XM982	B200BH2		0				0	0	0	0	0	0	0	0	9	
XM982	B200CH2						0	0	0	0	0	0	0	0	8	
XM982	B200DH2								0	0	0	0	0	0	6	
XM982	B200EH2								0	0	0	0	0	0	6	
Total		0	26	24	8	6	31	29	50	59	62	67	75	79	516	

Causes for Zero BOH
Table L-32

To quantify a measure of risk, the maximum consumption of class V by a unit for any TP is compared with the current BOH for each TP; if the value is less than one, the unit would exhaust its supplies prior to repeating the activities of this "maximum" TP. Where "at risk" is less than one TP of supply, class V was generally provided to maneuver units without placing them "at risk." Fifty maneuver units were "at risk." See Table L-33.

MANEUVER UNIT	TP													# of TPs
	0	1	2	3	4	5	6	7	8	9	10	11	12	
B003MA1												1	1	2
B00A1M2		1	1	1	1	1	1	2	2	2	3	3	3	12
B00A2M2		2	2	2	2	2	2	2	2	2	2	2	2	12
B00A3M2			1	1	1	1	1	2	2	2	2	2	2	11
B00A4M2			1	1	1	1	1	2	2	2	2	3	3	11
B00A5M2		1	1	1	1	1	1	2	2	2	2	3	3	12
B00A6M2		1	1	1	1	1	1	1	1	2	2	2	2	12
B00A7M2		1	2	2	2	4	5	5	5	6	6	6	6	12
B00A8M2		1	2	2	2	4	4	4	4	6	6	6	6	12
B00A9M2		3	3	2	2	4	5	5	5	6	6	6	7	12
B00B1M2		3	4	4	4	6	7	7	7	7	7	7	7	12
B00B2M2		3	4	4	4	5	7	7	7	7	7	7	7	12
B00B3M2		3	3	3	3	5	6	6	6	6	6	6	6	12
B00B4M2			1	1	1	1	1	1	1	1	1	1	1	11
B00B5M2		1	1	1	1	1	1	1	1	1	1	1	1	12
B00B6M2		1	1	1	1	1	1	1	1	1	1	1	1	12
B00BAH2		3	5	5	5	5	5	5	5	5	5	5	5	12
B00BBH2		3	5	5	5	5	5	5	5	5	5	5	5	12
B00BCH2		3	5	5	5	5	5	5	5	5	5	5	5	12
B00C1M2						1	2	4	4	4	4	5	5	8
B00C2M2								1	1	2	2	3	3	6
B00C3M2								1	1	2	2	3	3	6
B00C4M2									1	2	2	3	3	5
B00C5M2								2	2	2	2	3	3	6
B00C6M2								1	1	2	2	3	3	6
B00CAH2						2	2	5	6	6	6	6	6	8
B00CBH2						1	1	5	6	6	6	6	6	8
B00CCH2						1	1	5	5	5	6	6	6	8
B200AH2			2	2	1	4	4	4	5	6	6	6	6	11
B200BH2		3	4	3	3	3	3	3	3	4	6	6	6	12
B200CH2		3	3	3	3	4	4	4	4	4	5	5	5	12
B200DH2		3	5	4	4	4	4	4	5	5	5	5	6	12
B200EH2		3	4	4	4	4	4	4	5	5	5	5	5	12
B200FH2		3	2	2	2	2	2	3	5	5	5	5	5	12
B200GM2								2	3	3	3	3	3	6
B200HM2								2	3	3	3	3	3	6

MANEUVER UNIT	TP													# of TPs
	0	1	2	3	4	5	6	7	8	9	10	11	12	
B2001M2								2	2	2	2	3	3	6
B2011MX	1	1	1	1	1	1	1	1	1	1	1	1	1	13
B2012MX	1	1	1	1	1	1	1	1	1	1	1	1	1	13
B2023MX	1	1	1	1	1	1	1	1	1	1	1	1	1	13
B2024MX	1	1	1	1	1	1	1	1	1	1	1	1	1	13
B20300H	6	6	6	6	6	6	6	6	6	6	6	6	6	13
B2030IN								1	1	1	1	1	1	6
B2031IN								1	1	1	1	1	1	6
B2032DC			1											1
B2032IN								1	1	1	1	1	1	6
B2036IN								2	2	2	2	2	2	6
B203G0H	1	1	1	1	1	1	1	1	2	2	2	2	2	13
B203R0H									1	1	1	1	1	5
B203U0H	5	5	5	5	5	5	5	5	5	5	5	5	5	13

"At Risk" Units, Class V Risk
Table L-33

(d) Observations.

- 1) There were several occurrences of zero balance on hand for the 155MM munition type; however, at no time were all 155MM sub-munition categories at zero balance.
- 2) 3rd Bn 1st Bde CORPS Arty and 1st Bn 2nd Bde CORPS Arty expended all of their ATACMS munition type in TP 5 through the end of the scenario. There was an insufficient quantity of ATACMS munition type available by the end of the scenario.
- 3) For the MLRS munition type, the ER-MLRS sub-munition had a few occurrences of zero balance; however, at no time were all MLRS sub-munition categories at zero balance.

APPENDIX A

DDA VIC Name to Unit Name Cross Reference

VIC Name	Unit Name
B000000	10th CORPS
B00RCSB	10 CORPS REAR
B00FCSB	10 CORPS FWD
B003IA1	AVENGER PLT
B003JA1	AVENGER PLT
B003KA1	AVENGER PLT
B003LA1	AVENGER PLT
B003MA1	AVENGER PLT
B003NA1	AVENGER PLT
B000PAT	PATRIOT BATTALION HQ
B001PAT	A BTRY PATRIOT BN
B002PAT	B BTRY PATRIOT BN
B003PAT	C BTRY PATRIOT BN
B004PAT	D BTRY PATRIOT BN
B005PAT	E BTRY PATRIOT BN
B001USF	1ST US SOF TEAM ODA 171
B002USF	2ND US SOF TEAM ODA 172
B003USF	3RD US SOF TEAM ODA 173
B004USF	4TH US SOF TEAM ODA 174
B005RSF	5TH SOF TEAM
B006RSF	6TH SOF TEAM
B007RSF	7TH SOF TEAM
B008RSF	8TH SOF TEAM
B009RSF	9TH SOF TEAM
B010RSF	10TH SOF TEAM
B001CSA	1ST CORPS SUPPLY AREA 551ST AMMO GS
B001ASP	AMMO SUPPLY POINT
B002ASP	AMMO SUPPLY POINT
B003ASP	AMMO SUPPLY POINT (SUPPORTING 52TH)
B004ASP	AMMO SUPPLY POINT (ARTY ASP)
B001POL	CORPS SUPPORT AREA (POL)
B001CSB	CORPS SUPPORT BN FORWARD (POL)
B001SUP	CORPS SUPPLY AREA (SUB)
B002SUP	CORPS SUPPORT BN FORWARD (SUB)
B0001EN	EN CO
B0002EN	EN CO
B0003EN	EN CO
B0004EN	EN CO
B0005EN	EN CO
B0006EN	EN CO
B0007EN	EN CO
B0008EN	EN CO
B00A002	68TH FA BDE X CORPS HQ
B00A1M2	A BTY 1ST BN 1ST BDE X CORPS ARTY
B00A2M2	B BTY 1ST BN 1ST BDE X CORPS ARTY
B00A3M2	C BTY 1ST BN 1ST BDE X CORPS ARTY
B00A4M2	A BTY 2ND BN 1ST BDE X CORPS ARTY

VIC Name	Unit Name
B00A5M2	B BTY 2ND BN 1ST BDE X CORPS ARTY
B00A6M2	C BTY 2ND BN 1ST BDE X CORPS ARTY
B00A7M2	A BTY 3RD BN 1ST BDE X CORPS ARTY
B00A8M2	B BTY 3RD BN 1ST BDE X CORPS ARTY
B00A9M2	C BTY 3RD BN 1ST BDE X CORPS ARTY
B00AAH2	A BTY 4TH BN 1ST BDE X CORPS ARTY
B00ABH2	B BTY 4TH BN 1ST BDE X CORPS ARTY
B00ACH2	C BTY 4TH BN 1ST BDE X CORPS ARTY
B00B002	67TH FA BDE X CORPS ARTY HQ
B00B1M2	A BTY 1ST BN 2ND BDE X CORPS ARTY
B00B2M2	B BTY 1ST BN 2ND BDE X CORPS ARTY
B00B3M2	C BTY 1ST BN 2ND BDE X CORPS ARTY
B00B4M2	A BTY 2ND BN 2ND BDE X CORPS ARTY
B00B5M2	B BTY 2ND BN 2ND BDE X CORPS ARTY
B00B6M2	C BTY 2ND BN 2ND BDE X CORPS ARTY
B00BAH2	A BTY 3RD BN 2ND BDE X CORPS ARTY
B00BBH2	B BTY 3RD BN 2ND BDE X CORPS ARTY
B00BCH2	C BTY 3RD BN 2ND BDE X CORPS ARTY
B00C002	3RD FA BDE X CORPS ARTY HQ
B00C1M2	A BTY 1ST BN 3RD BDE X CORPS ARTY
B00C2M2	B BTY 1ST BN 3RD BDE X CORPS ARTY
B00C3M2	C BTY 1ST BN 3RD BDE X CORPS ARTY
B00C4M2	A BTY 2ND BN 3RD BDE X CORPS ARTY
B00C5M2	B BTY 2ND BN 3RD BDE X CORPS ARTY
B00C6M2	C BTY 2ND BN 3RD BDE X CORPS ARTY
B00CAH2	A BTY 4TH BN 3RD BDE X CORPS ARTY
B00CBH2	B BTY 4TH BN 3RD BDE X CORPS ARTY
B00CCH2	C BTY 4TH BN 3RD BDE X CORPS ARTY
B00A00H	1 BN GS BDE X CORPS AVN
B00G00H	1 BN 1 ATK BDE X CORPS AVN
B00H00H	2 BN 1 ATK BDE X CORPS AVN
B2000AR	EXFOR DIVISION
B200DSA	EXFOR DISCOM
B201GA1	AVENGER PLT
B201LA1	AVENGER PLT
B2000EN	ENGINEER GROUP
B2010EN	A CO, ENGINEER GROUP
B2020EN	B CO, ENGINEER GROUP
B2030EN	C CO, ENGINEER GROUP
B2040EN	D CO, ENGINEER GROUP
B2050EN	E CO, ENGINEER GROUP
B2060EN	F CO, ENGINEER GROUP
B2070EN	AVN DS, ENGINEER GROUP
B2080EN	DIV GS, ENGINEER GROUP
B011RSF	10TH SOF TEAM
B012RSF	10TH SOF TEAM
B013RSF	10TH SOF TEAM
B014RSF	10TH SOF TEAM
B2010MX	1 BDE EXFOR (AR)

VIC Name	Unit Name
B2011DC	1 BDE RECON CO
B2011MX	TF 1-1 MX
B2011FC	FORWARD SUPPORT COMPANY
B2022AR	TF 2-2 AR
B2022FC	FORWARD SUPPORT COMPANY
B2013AR	TF 1-3 AR
B2013FC	FORWARD SUPPORT COMPANY
B2014AR	TF 1-4 AR
B2014FC	FORWARD SUPPORT COMPANY
B201FSB	FSB 1 BDE EXFOR (MX)
B201AA1	BSFV PLT
B201JA1	BSFV PLT
B201KA1	AVENGER PLT
B2020MX	2 BDE EXFOR (AR)
B2021DC	2 BDE RECON CO
B2021AR	TF 2-1 AR
B2021FC	FORWARD SUPPORT COMPANY
B2012MX	TF 1-2 MX
B2012FC	FORWARD SUPPORT COMPANY
B2023MX	TF 2-3 MX
B2023FC	FORWARD SUPPORT COMPANY
B2024MX	TF 2-4 MX
B2024FC	FORWARD SUPPORT COMPANY
B201CA1	BSFV PLT
B201EA1	BSFV PLT
B201DA1	AVENGER PLT
B202FSB	FSB 2 BDE EXFOR (AR)
B2030AV	AVIATION BDE
B2030DC	CAV SQDRN
B2031DC	A TRP
B2032DC	B TRP
B2033DC	C TRP
B20300H	FARP
B203G0H	CAV SQD GRD/AIR RECON
B203R0H	DIVISION AIR RECON
B203A0H	ATTACK BN
B203U0H	LIFT BN
B2030IN	INFANTRY BN HQ
B2030FC	FORWARD SUPPORT COMPANY
B2031IN	Air Aslt Plt
B2032IN	Air Aslt Plt
B2033IN	Air Aslt Plt
B2034IN	Air Aslt Plt
B2035IN	Air Aslt Plt
B2036IN	Air Aslt Plt
B2037IN	Air Aslt Plt
B2038IN	Air Aslt Plt
B2039IN	Air Aslt Plt
B201HA1	AVENGER PLT

VIC Name	Unit Name
B201FA1	AVENGER PLT
B201BA1	AVENGER PLT
B20DASB	AVIATION SUPPORT
B200002	DIVARTY EXFOR
B201IA1	AVENGER PLT
B200AH2	1 BN-A 155SP BTRY EXFOR DIVARTY
B200BH2	1 BN-B 155SP BTRY EXFOR DIVARTY
B200CH2	1 BN-C 155SP BTRY EXFOR DIVARTY
B200DH2	2 BN-A 155SP BTRY EXFOR DIVARTY
B200EH2	2 BN-B 155SP BTRY EXFOR DIVARTY
B200FH2	2 BN-C 155SP BTRY EXFOR DIVARTY
B200GM2	4 BN-A MLRS BTY EXFOR DIVARTY
B200HM2	4 BN-B MLRS BTY EXFOR DIVARTY
B200IM2	4 BN-B MLRS BTY EXFOR DIVARTY

APPENDIX B

DEFINITIONS

Specific supply analysis definitions are listed below:

(1) Amount Authorized of this supply type: Amount of this supply type that this unit is authorized at the end of the TP, this number is calculated by multiplying the number of available systems that use this supply type by the amount authorized per system. This number can change from one TP to another due to weapon losses.

(2) Balance on-Hand of this supply type: Amount of this supply type that this unit has on hand at the end of the TP.

(3) Amount Used during this TP: Amount of this supply type that this unit used during this TP.

(4) Amount Lost during this TP: Amount of this supply type that this unit lost due to attrition of systems (when a system is damaged in combat a percentage (50%) of its on-board supplies are lost).

(5) Ratio of Balance on-Hand to Amount Authorized: A percent value used to indicate overall assessment of a munition; when this percent value is low, a greater risk is indicated as to possibility of exhausting all supplies.

(6) Total Amount Authorized during this TP: The sum of each amount authorized of each supply type at the end of the TP. The stockages are redistributed, consumed, or lost as the scenario proceeds. As units are engaged and attrited, the amount-authorized is reconciled with the number of surviving weapon systems.

(7) Total Amount on-Hand during this TP: The sum of the amount of each supply type that the units actually have in stock at the end of the TP. This amount is reduced by consumption, attrition, and other activities that may reduce the stockage of a supply type.

(8) Total Amount Used during this TP: The sum of the amount of each supply type consumed as a result of movement and combat at the of the TP.

(9) Total Amount Lost during this TP: The sum of the amount of each supply type lost due to attrition of systems at the end of the TP (when a system is damaged in combat, a percentage of its on-board supplies are lost).

(10) Total Amount on-Order during this TP: The sum of the amounts of each supply ordered by each unit during a period. As materiel is consumed, units initiate orders based on a re-order threshold to restock its supplies. If an order cannot be shipped for reasons of shortages of stocks or movers, a unit will re-order the replenishments during the next period.

(11) Timely fashion: The manner in which a unit is supported when a negative consequence did not result. When a maneuver unit calls for replenishment of supplies, the support of the maneuver unit shall be said to be in a "timely fashion," if the maneuver unit did not suffer for lack of supplies. For class III, a unit suffers when it is forced to stop for lack of class III. For class V, a unit suffers a negative consequence when it exhausts a class V supply type.

(12) Risk: The proportion of TPs that each supply type for each unit can be expected to last given the greatest consumption for the scenario. The higher the measure, the greater the quantity of stockage, hence the lower the likelihood of not being able to repeat the highest consumption of a TP.

(13) Standard Resupply: Maneuver units will generate an order for a supply type when, per the resupply schedule, the on-hand plus on-order quantity is less than 75 percent of the authorized quantity. The magnitude of the order is the amount of each supply type to bring the on-hand plus on-order quantity up to the authorized quantity. Routinely, the order is for 25% of authorized. When the shipment arrives, the on-hand balance will increase, and the maneuver unit will issue an order when the on-hand quantity again falls below the 75% authorized. Exceptions to this resupply process occur when, for lack of trucks or stocks, an order cannot be filled or shipped. When the order (or portion of same) cannot be shipped in the period it was requested, the unfilled portion is lost - there are no backorders or due-outs. The maneuver unit will reassess its needs during the next period. Standard resupply can be divided into two types: supply point distribution (SPD) and unit distribution (UD). A unit that uses SPD provides its own organic transporters to convey replenishments between the supply unit(s) and itself; a unit using UD requires the supply unit to provide both replenishments and transporters.

(14) Emergency Resupply: Maneuver units will generate an "emergency" order for a supply type when, per the resupply schedule, the on-hand plus on-order quantity is less than 50 percent of the authorized quantity. The magnitude of the order is the amount of each supply type to bring the on-hand quantity up to 50% of the authorized quantity. When the shipment arrives, the on-hand balance will increase. This is "emergency resupply." Emergency resupply is subject to a number of factors: (1) the availability of replenishment stockages; (2) the availability of helicopter support to provide airlift between the supporting CSS unit(s) and the requesting maneuver unit; and (3) the hostile environment surrounding the maneuver unit. If the scenario is short-lived or has intensive combat, the last factor can be the most limiting. Helicopters will not provide lift to maneuver units that are under assault. If any one of the factors prohibits emergency resupply, the "emergency" request for replenishments will be routed for "standard" resupply. When the order (or portion of same) cannot be shipped in the time period it was requested, the unfilled portion is lost - there are no backorders or due-outs - the unit must wait for the next period per the resupply schedule to assess its stockage position and re-order.

APPENDIX C

FIGURES AND TABLES

Unit Name	Amount Shipped	# of Deliveries	Minimum Time to Deliver	Avg Time to Deliver	Maximum Time to Deliver
B001CSB	220,387.36	116	0.81	3.03	8.92
B001POL	53,547.82	10	2.16	4.03	8.83
B2011FC	22,122.57	6	0.97	4.32	6.7
B2012FC	26,596.75	6	2	3.83	6.21
B2013FC	37,498.31	6	2.71	4.58	7.11
B2014FC	38,613.99	6	2.65	5.29	7.78
B201FSB	7,713.47	4	1.71	3	5.1
B2021FC	39,501.47	7	1.22	4.5	9.6
B2022FC	37,742.19	6	3.13	5.36	7.62
B2023FC	29,440.98	6	1.72	3.5	7.25
B2024FC	26,287.59	6	1.62	3.6	6.83
B202FSB	7,510.47	4	2.6	4.77	7.27
B200DASB	51,523.28	12	1.84	7.73	13.71

Order to Deliver, Class III
Table C-1

Unit Name	Amount Shipped	# of Non-Deliveries	Minimum Time to Deliver	Avg Time to Deliver	Maximum Time to Deliver
B001CSA	62,774.72	93	5.21	9.64	21.83
B003ASP	36.52	2	2.34	2.9	3.45
B004ASP	3,428.3	36	1.46	5.14	15.71
B2021FC	35.25	1	1.13	1.13	1.13
B2030FC	308.75	2	0.53	5.42	10.31
B20DASB	2,646.48	4	4.98	5.44	5.63

Order to Deliver, Class V
Table C-2

TP	USED GALS	LOST GALS	REQUIREMENT CONSUMED	AMOUNT RECEIVED BY AIR	AMOUNT RECEIVED BY TRUCK	AMOUNT REQUESTED	AMOUNT SHIPPED	% of ORDERED
0	0	0	0	0	0	0	0	---
1	108,781	30	108,811	0	0	63,286	63,286	100
2	97,047	85	97,132	0	26,799	69,054	69,054	100
3	69,748	8	69,756	0	57,423	48,611	48,611	100
4	69,314	0	69,314	0	65,606	100,516	90,210	90
5	47,099	841	47,940	0	76,857	17,383	12,124	70
6	123,504	2,112	125,616	0	37,319	103,375	97,127	94
7	84,554	3,496	88,050	0	78,074	91,224	90,212	99
8	33,573	1,297	34,870	0	36,830	8,993	3,796	42
9	19,498	153	19,651	0	31,789	19,390	10,888	56
10	53,650	56	53,706	0	12,829	98,519	93,592	95
11	59,535	258	59,793	0	71,293	39,291	32,091	82
12	23,047	259	23,306	0	34,297	28,436	23,654	83
TOTAL	789,350	8,594	797,944	0	529,115	688,077	634,644	92

Consumption of Class III, Gallons
Table C-3

TP	USED STONS	LOST STONS	REQUIREMENT CONSUMED	AMOUNT RECEIVED BY AIR	AMOUNT RECEIVED BY TRUCK	AMOUNT REQUESTED	AMOUNT SHIPPED	% of ORDERED
0	0	0	0	0	0	0	0	---
1	1,203	0	1,203	0	1	436	415	95
2	844	0	844	0	179	214	213	100
3	0	0	0	0	339	0	0	---
4	18	0	18	0	57	0	0	---
5	543	20	563	0	1	59	59	100
6	123	45	168	0	29	54	54	100
7	993	43	1,036	0	38	248	230	93
8	763	27	789	0	0	165	165	100
9	507	2	509	0	40	278	278	100
10	323	0	324	0	8	140	139	100
11	1,933	5	1,938	0	117	331	317	96
12	331	1	331	0	98	193	193	100
TOTAL	7,581	144	7,725	0	908	2,117	2,063	97

Consumption of Class V, STONS
Table C-4

TP	USED GALS	LOST GALS	REQUIREMENT CONSUMED	AMOUNT RECEIVED BY AIR	AMOUNT RECEIVED BY TRUCK	AMOUNT REQUESTED	AMOUNT SHIPPED	% of ORDERED
0	0	0	0	0	0	0	0	---
1	80,641	30	80,671	0	0	63,286	63,286	100
2	70,081	85	70,167	0	26,799	35,650	35,650	100
3	47,347	2	47,349	0	24,020	45,665	45,665	100
4	46,750	0	46,750	0	59,233	63,056	57,839	92
5	28,430	718	29,148	0	47,914	9,630	9,630	100
6	88,777	801	89,577	0	34,824	75,323	74,081	98
7	56,309	1,527	57,836	0	45,807	44,908	43,896	98
8	17,757	455	18,212	0	26,353	1,298	1,298	100
9	7,704	97	7,801	0	31,789	8,985	5,648	63
10	35,820	56	35,876	0	5,887	56,929	56,929	100
11	37,663	191	37,854	0	40,563	19,200	16,818	88
12	11,122	258	11,380	0	26,973	16,423	11,641	71
TOTAL	528,401	4,220	532,621	0	370,162	440,355	422,382	96

Consumption of Class III, Gallons (SDID-O)
Table C-3a

TP	USED STONS	LOST STONS	REQUIREMENT CONSUMED	AMOUNT RECEIVED BY AIR	AMOUNT RECEIVED BY TRUCK	AMOUNT REQUESTED	AMOUNT SHIPPED	% of ORDERED
0	0	0	0	0	0	0	0	---
1	309	0	309	0	1	40,175	27,161	95
2	127	0	127	0	112	2,901	2,881	100
3	0	0	0	0	45	0	0	---
4	0	0	0	0	20	0	0	---
5	127	12	139	0	1	395	395	100
6	11	10	21	0	29	116	116	100
7	453	30	483	0	9	689	458	93
8	404	9	413	0	0	1,937	1,937	100
9	142	1	143	0	0	439	439	100
10	102	0	103	0	3	318	307	100
11	168	4	171	0	15	614	440	96
12	161	1	162	0	66	81	81	100
TOTAL	2,004	67	2,072	0	300	47,664	34,215	97

Consumption of Class V, STONS (SDID-O)
Table C-4a

TP	USED GALS	LOST GALS	REQUIREMENT CONSUMED	AMOUNT RECEIVED BY AIR	AMOUNT RECEIVED BY TRUCK	AMOUNT REQUESTED	AMOUNT SHIPPED	% of ORDERED
0	0	0	0	0	0	0	0	---
1	28,140	0	28,140	0	0	0	0	---
2	26,966	0	26,966	0	0	33,403	33,403	100
3	22,401	6	22,407	0	33,403	2,946	2,946	100
4	22,564	0	22,564	0	6,372	37,459	32,370	86
5	18,670	122	18,792	0	28,943	7,753	2,494	32
6	34,727	1,311	36,038	0	2,494	28,052	23,046	82
7	28,245	1,969	30,214	0	32,267	46,316	46,316	100
8	15,816	842	16,658	0	10,477	7,695	2,498	32
9	11,794	56	11,850	0	0	10,405	5,239	50
10	17,830	0	17,830	0	6,942	41,590	36,663	88
11	21,872	67	21,939	0	30,731	20,090	15,274	76
12	11,926	0	11,926	0	7,324	12,013	12,013	100
TOTAL	260,949	4,374	265,323	0	158,954	247,723	212,262	86

Consumption of Class III, Gallons (CORPS)
Table C-3b

TP	USED STONS	LOST STONS	REQUIREMENT CONSUMED	AMOUNT RECEIVED BY AIR	AMOUNT RECEIVED BY TRUCK	AMOUNT REQUESTED	AMOUNT SHIPPED	% of ORDERED
0	0	0	0	0	0	0	0	---
1	894	0	894	0	0	1,119	1,119	100
2	717	0	717	0	68	936	936	100
3	0	0	0	0	295	0	0	---
4	18	0	18	0	37	0	0	---
5	417	8	425	0	0	385	385	100
6	111	35	146	0	0	16,445	16,445	100
7	540	13	553	0	29	18,720	18,720	100
8	358	18	376	0	0	206	206	100
9	365	2	366	0	40	592	592	100
10	221	0	221	0	5	469	469	100
11	1,766	1	1,767	0	102	1,759	1,759	100
12	170	0	170	0	32	545	545	100
TOTAL	5,576	77	5,653	0	608	41,177	41,177	100

Consumption of Class V, STONS (CORPS)
Table C-4b

CLASS III & V, TRUCKLOADS BY TP																
TP	2.75RKT	5.50MM	B20MM	B30MM	ER-MLRS	LONGROW	M107(CB)	M26	M483AI	M549AI	M720	M795	M864	PGMM	POL-B	TOTAL
1			0.2	1.2	9.3	4.9	1.8		1.0	5.1	0.3	1.4	2.2		25.3	55
2			0.3	1.2	9.7	5.2	3.8	5.5	3.4	5.1		1.4	2.2	0.1	46.3	89.1
3			0.3	1.2	8.1	5.0	1.9	5.5	2.4	2.0			0.1	0.1	53.7	85.3
4			0.2	0.8		5.0	1.5		0.6	0.7					64.0	77.2
5						0.3	0.9		0.7	0.7		0.6	0.4	0.0	45.3	53.9
6			0.1	0.5		3.5	1.6		0.7	0.7		0.6	0.4		53.6	67.7
7			0.2	0.9	6.7	3.5	1.6		0.6	0.8			0.6		60.7	86.9
8	2.3		0.2	0.9	7.6	3.8		3.8	2.3	0.8			0.6		37.8	72.9
9	2.3		0.1	0.5	8.9	3.9	1.2	14.9	2.8	0.8			0.6		27.5	77.7
10	2.3				7.8	1.3	1.7	20.1	2.8	0.8			0.3		36.2	89.7
11	2.3	0.0			7.8	1.3	1.7	34.2	2.6	1.0		0.8	0.3		42.5	114
12	2.3	0.0			4.6	1.3	1.7	43.3	2.4	0.2		1.3	0.2		26.2	102.4

CLASS III & V, PERCENTAGE BY TP																
TP	2.75RKT	5.50MM	B20MM	B30MM	ER-MLRS	LONGROW	M107(CB)	M26	M483AI	M549AI	M720	M795	M864	PGMM	POL-B	TOTAL
1	0	0	0.36	2.18	16.91	8.91	3.27	0	1.82	9.27	0.55	2.55	4	0	46	100
2	0	0	0.34	1.35	10.89	5.84	4.26	6.17	3.82	5.72	0	1.57	2.47	0.11	51.96	100
3	0	0	0.35	1.41	9.5	5.86	2.23	6.45	2.81	2.34	0	0	0.12	0.12	62.95	100
4	0	0	0.26	1.04	0	6.48	1.94	0	0.78	0.91	0	0	0	0	82.9	100
5	0	0	0	0	0	0.56	1.67	0	1.3	1.3	0	1.11	0.74	0	84.04	100
6	0	0	0.15	0.74	0	5.17	2.36	0	1.03	1.03	0	0.89	0.59	0	79.17	100
7	0	0	0.23	1.04	7.71	4.03	1.84	0	0.69	0.92	0	0	0.69	0	69.85	100
8	3.16	0	0.27	1.23	10.43	5.21	0	5.21	3.16	1.1	0	0	0.82	0	51.85	100
9	2.96	0	0.13	0.64	11.45	5.02	1.54	19.18	3.6	1.03	0	0	0.77	0	35.39	100
10	2.56	0	0	0	8.7	1.45	1.9	22.41	3.12	0.89	0	0	0.33	0	40.36	100
11	2.02	0	0	0	6.84	1.14	1.49	30	2.28	0.88	0	0.7	0.26	0	37.28	100
12	2.25	0	0	0	4.49	1.27	1.66	42.29	2.34	0.2	0	1.27	0.2	0	25.59	100

Truckloads On-Road, CSS-to-Maneuver Units
Table C-5

		CLASS III, AMOUNT ON HAND BY HOUR																	
		B001CSA	B001CSB	B001POL	B00FCSE	B00RCSE	B200DSA	B2011FC	B2012FC	B2013FC	B2014FC	B201FSB	B2021FC	B2022FC	B2023FC	B2024FC	B202FSB	B2030FC	B20DASB
0	12,500	720,000	720,000	3,100,000	2,500	400,500	3,600	12,500	12,500	22,500	22,500	146,200	22,500	22,500	12,500	12,500	146,200	2,500	50,000
1	12,500	720,000	720,000	3,099,802	2,500	400,500	3,600	7,814	7,787	16,163	16,125	146,200	16,132	16,176	7,787	7,805	146,200	2,500	30,924
2	12,500	666,452	666,452	3,099,247	2,500	400,500	3,600	7,814	7,787	16,163	16,125	144,151	10,035	16,176	7,787	7,805	144,250	2,500	25,514
3	12,500	659,760	659,760	3,053,545	24,330	400,500	3,600	3,396	2,900	10,225	9,245	144,151	10,035	9,211	2,569	2,596	122,421	2,500	23,112
4	7,488	614,883	614,883	3,074,137	24,330	400,500	0	0	0	3,806	2,440	61,893	4,059	3,012	3,120	5,269	81,486	2,500	23,112
5	7,488	614,883	3,064,780	24,330	400,500	0	9,623	9,492	4,251	5,782	7,228	73,313	0	6,075	4,461	187	107,759	2,500	0
6	0	570,518	3,042,323	24,330	400,500	0	9,623	4,251	0	0	1,216	60,750	0	522	0	187	50,408	2,500	0
7	0	502,053	3,024,302	24,330	400,500	0	6,190	0	0	7,647	7,711	60,750	0	522	0	187	36,171	2,500	8,667
8	0	476,554	2,997,298	24,330	400,500	0	6,190	0	0	7,647	7,711	67,488	6,874	12,968	5,075	4,717	23,517	2,500	8,667
9	0	473,815	2,994,644	24,330	400,500	0	6,190	5,159	554	1,191	1,612	69,818	986	7,337	275	4,717	71,859	2,500	2,904
10	0	423,566	2,976,721	24,330	400,500	0	2,238	554	554	1,082	1,612	37,237	1,614	7,337	275	631	61,387	2,500	0
11	0	369,273	2,951,108	24,330	400,500	0	2,238	554	554	1,082	1,612	37,237	1,614	7,337	275	631	61,387	2,500	0
12	0	355,010	2,963,402	24,330	400,500	0	0	0	0	1,082	1,612	37,237	1,614	738	275	631	63,243	2,500	0

Class III Balance for Supply Points
Table C-6